November 1960

Agriculture

Volume LXVII Number 8

Dorset Horn: Mother and twins

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Cover photograph: Dorset Horn: Mother and twins *Photo: John Tarlton*

The Late Sir George Stapledon

T. J. JENKIN
Aberystwyth

It is with profound regret that we record the death of Sir George Stapledon, C.B.E., F.R.S. on 16th September at the age of 77.

THE name of R. G. Stapledon will be associated for all time with the improvement of British grasslands during the first half of the twentieth century and with the new enthusiasm for grassland study and development throughout the world during that period.

He was born in Northam, North Devon in 1882, and educated at Westward Ho! and Emmanuel College, Cambridge. He joined the Indian Civil Service but left it in 1907 to return to Cambridge to read for an agricultural diploma —the first step on a road which was to take him well beyond the limiting horizon of contemporary agricultural thought.

His appointment, at the Royal Agricultural College, Cirencester, gave him the opportunity of specializing in the study of grass. In 1912 he was made Adviser in Agricultural Botany at University College, Aberystwyth; in 1917 he became the first Director of the Official Seed Testing Station and then, two years later, he was appointed Professor of Agricultural Botany at University College and Director of the Welsh Plant Breeding Station.

Fundamentally, Sir George Stapledon was a plant ecologist and he was the first to make a practical approach to the problems of grassland improvement from that point of view. A plant succeeds in proportion to its own constitution and its environment. Climatic and edaphic factors are involved, as also are inter-plant competition, the presence or absence of grazing animals, and, above all, the interference of man.

Stapledon undoubtedly derived great personal pleasure from studying and mapping the plant associations of North Cardiganshire, and particularly those of the uplands, in his early years at Aberystwyth, but he realized, perhaps rather sadly, that this delightful patchwork must be changed if means could be found to replace it with grassland that would make the work of the hill farmer easier, more interesting, and more remunerative.

There were lowland pastures, too, which did not represent the full potentialities of the land they occupied. For some reason, the farmer's efforts were less effective than they might and should be. Land that had been cleaned and manured under the plough deserved the best grass and clover seeds available, hence the Official Seed Testing Station, the 1920 Seeds Act and the regulations associated with it. If the seed available did not suit the purpose or the situation, more suitable seed must be sought: hence the Welsh Plant Breeding Station. If a natural situation could not support a better type of plant, the situation must be improved up to the limits set by factors beyond the control of man. Such would be the reasoning of Stapledon, the plant ecologist.

In approaching his main task, Stapledon was not hampered by preconceived ideas nor by farming traditions; nor did he allow himself to be hampered by traditional methods. Yields of hay were irrelevant in the study of a

grazed pasture. The ecological question was, how did individual plants and species behave and interact under any particular system of treatment and management? Hence the importance of floristics in the development of suitable methods.

This independence of outlook was one of Stapledon's great characteristics, but with it he had a great gift for interpretation. He had an amazing capacity for visualizing, sifting, and correlating a large mass of information derived from many trials and experiments in such a way that he could pick out the essential pattern of the whole. Moreover, he had the self-confidence and courage to act boldly upon his interpretation in planning further work.

Stapledon was, admittedly, a great propagandist. But his propaganda was based upon his own firm convictions and it was therefore always honest and sincere. In making his points, he wasted neither time nor words but he often indulged in whimsical language in expressing important truths. Such expressions, however, never became stock phrases. They came so naturally, each exactly to fit the occasion, that they seemed to be inevitable. But they were wholly his own and could not be imitated.

Although we may never learn the details, as judged by results he must have been equally convincing in close conclave. The establishment of the Official Seed Testing Station in 1917, the Welsh Plant Breeding Station in 1919, and the Cahn Hill Improvement Scheme in 1933 are outstanding examples of his influence and success in negotiations.

As Director of the Welsh Plant Breeding Station, he trusted the senior members of his staff implicitly and allowed them great freedom in the development of their own particular lines of work. He did not demand uniformity of procedure, except in matters of day-to-day routine. What he did rightly expect was a unity of effort towards the achievement of his main purpose and ambition: the improvement of grasslands for the benefit of mankind.

Soil-borne Viruses

F. C. BAWDEN, M.A., F.R.S.

Director

Rothamsted Experimental Station, Harpenden, Herts

In Britain soil-borne viruses are mainly important in fruit crops and have been most damaging in Scottish raspberry plantations, but in some countries they cause serious diseases of many other field crops. We should be on guard against them.

THE plant viruses that attract most attention and get most publicity are those that cause such diseases as sugar beet yellows, potato leaf roll, lettuce mosaic, and mosaic in cauliflower and other cruciferous crops. These all behave much alike. The viruses survive from year to year in infected plants, or parts of plants such as potato tubers that live through the winter, and in spring and summer they are spread by aphids from these initial sources to newly planted crops. In years when aphids are plentiful and active, such viruses often become epidemic in susceptible crops over a large area. They are unquestionably the economically most important viruses of field crops in the United Kingdom, and they deserve all the publicity they get, perhaps even more. However, they are not the only kinds, and it is timely to dispel the widely held idea that their behaviour is typical of all viruses. Some behave very differently: these are not carried from plant to plant by aphids or other animals that are active above ground, and they can persist for long in infested soil where they infect plants through their roots. Although they spread over distances much less slowly than those carried by flying animals, they are by no means unimportant.

Tell a grower that his plant has contracted a virus from the soil, and he usually asks at once: are soil-borne viruses something new? The simple answer is no. Some of the diseases of the vine recently shown to be caused by soil-borne viruses have been known for more than a hundred years. Nor is there anything novel in the idea that viruses might be soil-borne: indeed, it is as old as, or even older than, the idea of viruses as a distinctive group of disease-causing entities. Viruses were first clearly distinguished from bacteria at the end of the nineteenth century, when the cause of tobacco mosaic was shown to pass through filters with pores small enough to retain all visible microbes. Some years before this, tobacco plants had been stated to contract the disease from infested soil, and the same claim was also made at the turn of the century for tobacco rattle, another disease since shown to be caused by a virus.

What is new is an appreciation of the importance and prevalence of some soil-borne viruses, and knowledge about how they are able to persist and spread below ground. Although much still remains to be learnt, it is already abundantly clear that not all soil-borne viruses behave alike. The simplest way to indicate the differences will be to discuss separately the five main types so far identified.

Tobacco (tomato) mosaic virus

The fact that tobacco mosaic was the first virus reported to be soil-borne may well have handicapped the general study of soil-borne viruses. It is exceptional in many ways, but particularly in its remarkable stability; it survives for very many years above ground in plant extracts or dead tissues, so there was nothing very surprising in the fact that it should also remain active in soil. There seemed nothing subtle about its persistence or ability to infect plants; it readily infects through wounded cells, so there is need only to postulate that roots become injured while growing through contaminated soil to get an acceptable explanation for the infections. Another fact that may have diverted people from seeking below-ground methods of spread for other soil-borne viruses is that tobacco mosaic virus can spread rapidly *above* ground, either when the leaves of infected and healthy plants rub together or when people handle healthy plants after handling infected ones. Spread above ground very likely leads to most tomato crops in the United Kingdom becoming 100 per cent infected long before the end of the growing season, but soil-borne virus may well be responsible for initiating many of the outbreaks. Now that other soil-borne viruses are being found to be spread by soil-borne organisms, the long-accepted mechanical explanation for the behaviour of tobacco mosaic virus in soil needs more critical examination than it has so far received.

Tobacco necrosis virus

These viruses were first discovered in the United Kingdom about thirty years ago, damaging tobacco seedlings raised under glass. For long they were thought to occur only in glasshouse soils, and they seemed to be of academic interest only. When deliberately inoculated to leaves, they infected almost any species of plant, but the natural infections found in plants other than tobacco were restricted to the roots and were all harmless. The first indication that this is not always so came when these viruses were found killing many tulips being forced under glass in the United Kingdom. This is still the only economically important trouble they have been found to cause in this country, but the viruses are now known to be prevalent in field soils as well as in glasshouses, and in other countries they have been found responsible for losses, not only in tulips, but in various kinds of other ornamental plants, runner beans and cucumbers; in the Netherlands, they have also been reported as causing superficial damage to potato tubers. For a time some workers thought they might cause the troublesome disease of lettuce known as big-vein, but this has recently been attributed to the fungus *Olpidium brassicae*. This is of some interest and mentioned here because *O. brassicae* has recently been claimed in Japan to transmit tobacco stunt virus. The claim has still to be confirmed but it raises the obvious questions: does *O. brassicae* also transmit tobacco necrosis viruses, and is big-vein a consequence of double infection by fungus and virus? No doubt they will soon be answered, but should the answers be no, it seems probable that some other soil organism will be found that aids the survival of these viruses and spreads them from plant to plant, because they seem too unstable to persist free in soil for long periods, and the mechanical explanation long thought

adequate for the behaviour of tobacco mosaic virus seems wholly inadequate with these.

Cereal mosaic viruses

These are the most important soil-borne viruses of agricultural crops, and fortunately the United Kingdom seems free from them. They have been most studied in the United States of America, where millions of acres of land are infested. Infection of seedlings can halve the yield of grain, and losses in Kansas alone in 1957 were valued at 4,000,000 dollars. However, varieties are now known that are not harmed by infection, and their use should avoid the recurrence of such losses.

Two viruses are recognized in the U.S.A., distinguished by the fact that one infects wheat but not oats and the other oats but not wheat. Neither seems to affect any crop except cereals, but ordinary crop rotations are an ineffective control measure because the virus can persist for many years in soil free from cereals, or indeed free from any higher plants, up to four years—even in dried soil. When extracted from plants, the viruses are highly unstable, inactivating within a few days, and they are difficult to transmit to healthy plants by rubbing with plant extracts. This, and much evidence of other kinds, points directly to the idea that these viruses persist in and are transmitted by some soil-inhabiting organism. Several organisms, eelworms and various fungi, have been tested, but so far with no success. The most obvious kind of suspect from existing information is perhaps a fungus able to form resting spores when conditions are unfavourable for its growth and acting as a superficial parasite of cereal roots when it is active.

The ringspot viruses

There are several soil-borne viruses that differ from one another in slight details but have broadly similar behaviour, which includes the ability to cause rings or spots in many of their host plants. Their importance is only now becoming evident, as within the last two years they have been identified as causing an increasing number of long-known diseases previously thought to have distinct causes. This rapid development has followed improvements in technique, which have allowed viruses from a wide range of fruit crops to be transmitted and studied in herbaceous plants. Previously such diseases as raspberry leaf curl, strawberry mosaic, peach yellow bud mosaic, cherry rasp leaf, and fanleaf of grape vine were never connected, but now it is evident that they have a common cause in viruses that also infect other crops as diverse as tomato, potato, turnip, oats and sugar beet, in addition to a very wide range of weed plants. Some of these viruses have been found in land that has never been cultivated, so their occurrence cannot be attributed simply to the too frequent growing of susceptible crops.

Although they can infect so many different kinds of both woody and herbaceous plants and are very widely distributed, they are important mainly to the growers of perennial crops. In the United Kingdom their most striking effect has been the devastation of many raspberry plantations in Scotland by the leaf curl disease, but they have also been troublesome to many growers of strawberries and to some of cherries. Typically, affected plantations have

diseased plants in patches, the size of which increases only slowly with increasing time, a foot or so per year. Within such patches, however, most or all plants become diseased, and replanting only leads in a year or two to the new plants also succumbing.

Several of these viruses have been found to be transmitted by eelworms, a species of the genus *Xiphinema*, which is rarely a direct pest of crop plants. The patchy distribution of diseased plants in most of the affected crops of strawberry and raspberry that have been examined coincides almost exactly with the occurrence of *Xiphinema* sp. in the soil. Indeed, it is rare for these to be found in soil free from the ringspot viruses. This remarkable correlation between the presence of eelworms and the ringspot viruses contrasts strikingly with aphid-borne viruses. It is true that these spread only where their aphid vectors are present, but the aphids often occur, sometimes in considerable numbers, without the viruses spreading, because the aphids have no infected plants from which to obtain virus. That the eelworms seem able to get the ringspot viruses nearly everywhere has a plausible explanation from the recent discovery that these viruses can be transmitted through the seeds of many of the weeds and some of the crop plants they infect. As the weeds include many free-seeding ones, such as groundsel, which have very efficient methods of dispersing their seeds, the opportunities for the viruses to have reached all soil infested with *Xiphinema* sp. are obvious. In soil free from *Xiphinema* sp., the introduction of infected weed seeds will be unimportant and pass unnoticed; but where *Xiphinema* sp. occur the viruses will be spread from the infected seedlings to crop plants, and will initiate disease outbreaks. Once *Xiphinema* obtain their viruses they remain able to infect plants for a long time, possibly for as long as they live.

At present it is the fruit grower who most needs to consider these viruses, and to know whether land which he is proposing to plant is infested with *Xiphinema* sp. Some success in controlling the diseases caused by these viruses in grape vines has been achieved by treating infested land with nematicides, but this is costly, and it remains to be seen whether the treatment eradicates the eelworms completely and whether the initial beneficial effects will be permanent. Raspberry and strawberry growers who must plant on infested land should choose their varieties carefully, for although the ringspot viruses can infect so many plants in such a wide range of different families, different raspberry and strawberry varieties differ greatly in their susceptibility and some are unharmed where others would be ruined.

Tobacco rattle and potato spraing

The condition known as spraing of potatoes, characterized by tubers showing areas of discoloured and corky tissue, has long been known in this country but its cause remained uncertain. That it often occurred on some fields was known, but it did not behave like any known potato virus disease or nutritional disorder. For example, not all tubers from one plant showed the symptoms, and when affected tubers were planted they gave crops free from spraing. Nevertheless, it now seems reasonably certain that spraing is caused by one of the oldest-known soil-borne viruses, tobacco rattle. There are three main reasons for the past uncertainties; first, spraing is an initial reaction to infection, shown when healthy plants have already developed

tubers before they become infected, and it rarely shows in tubers from plants that start life infected. Secondly, the rattle virus does not invade potato plants uniformly, or produce the same type of leaf symptoms in successive years in the life of infected plants, as do such viruses as potato leaf roll. Thirdly, the virus is difficult to transmit from potato tubers. In the United Kingdom, rattle virus is not yet known to be important except in potatoes, in which it affects quality rather than quantity of crop, but it can infect very many different kinds of plants. In other countries it has recently been identified as causing troublesome diseases in tulips and several other kinds of ornamental plants, both bulbous and not, in addition to potato and tobacco.

The rattle virus differs greatly in many of its properties from the soil-borne ringspot viruses, but it behaves much like they do in the soil and in infecting a wide range of weeds. There is increasing evidence pointing to the probability that it, too, is spread by eelworms.

New information on the way

Work on these soil-borne viruses is now proceeding actively and much new information can soon be expected, extending the knowledge of organisms that transmit them beyond the species of *Xiphinema* so far recognized. It is idle to try and anticipate this knowledge by now attempting to give advice on methods of control. It is evident, though, that methods effective against other kinds of soil-borne parasites of crops, except the use of resistant or tolerant varieties when such exist, are unlikely to succeed against these. Crop rotations that avoid damage from pests such as potato root eelworm or diseases such as take-all of wheat are clearly unlikely to affect the incidence of rattle or the ringspot viruses, which can infect and survive in most kinds of common weeds and crop plants; nor, when wheat mosaic virus can persist in infested land for over thirty years, is it any good expecting that a period under another crop will ease the position. Fortunately, except in the Scottish raspberry plantations, these soil-borne viruses are not yet a major problem of field crops in the United Kingdom. It is important, nevertheless, that their potentialities should be appreciated and every attempt made to guard against their spread beyond the places where they now occur.

Oxford Farming Conference

The fifteenth Oxford Farming Conference will be held on 2nd–4th January 1961 at the Town Hall, Oxford. Its theme will be *Food and Farming in a Changing World.*

Further details, and tickets, can be obtained from Mr. M. H. R. Soper, University Department of Agriculture, Parks Road, Oxford.

Glasshouse Crop Protection with Modern Chemicals

VALERIE COOKE, B.Sc.
Glasshouse Crops Research Institute, Littlehampton

New insecticides are introduced so often that it is hard for growers to keep track of them. Mrs. Cooke reviews some of the progress that has been made in the past few years.

THE discovery of the insecticidal properties of DDT in 1939 heralded a new era in pest control measures in both agriculture and horticulture. Since then the number of pesticidal chemicals has increased greatly, and new products continue to become available to commercial growers, who may ask for information not yet generally available from trials in which the new product has been critically compared with established products. The chemicals of particular value to nurserymen can be divided into three main groups: chlorinated hydrocarbons, for example DDT, BHC, aldrin; organo-phosphorous compounds, such as parathion, malathion, diazinon, phosdrin; and the persistent acaricides, for example fenson, which have little effect on pests other than spider mites.

Not only the pesticides but also the methods of application have altered. This is partly a result of the potency of these new chemicals, and partly because of the difficulties experienced by nurserymen in finding labour for orthodox high volume spraying. It is possible to kill pests in the confined space of a glasshouse by the release of toxic vapours, but no new highly volatile fumigants have been discovered, and the use of hydrogen cyanide or tetrachlorethane has been superseded by insecticides less dangerous to both men and plants. Several of the new insecticides are sufficiently volatile to be discharged as "smokes" from canisters or pellets, and some of these act partly as fumigants. The preparation of suitable pyrotechnic mixtures which permit the volatilization of the bulk of the insecticide without its decomposition by heat is rather expensive. Most commercial growers favour the alternative method of applying the insecticide as a mist, by atomizing a suitable solution with a paint spray-gun or similar device into the space of the glasshouse. Low volume methods, in which very small droplets of water-borne insecticide are directed on to the plants, are not widely used in Britain, but are used extensively in Holland. Many systemic insecticides can be applied as soil drenches, but the method is restricted to specialized usages as it requires more of the insecticide than orthodox spraying.

Chlorinated hydrocarbons

DDT is regarded as the first of the "new" insecticides, and proved of immense value in controlling a number of glasshouse pests. An example is the tomato moth, the caterpillars of which are reckoned to have caused an annual loss of £40,000 to the industry, in spite of endeavours to control them

with lead arsenate and derris. These caterpillars, now very rarely encountered in glasshouses, are susceptible to DDT, and treating with a 5 per cent dust at 10 lb an acre, or applying DDT in mists, smokes, and sprays at normal rates, will give complete control. Likewise caterpillars of other moths, such as tortrices on carnations and roses, are readily killed, provided they eat or come into contact with DDT. The use of DDT for the control of white fly is being superseded to some extent by the use of malathion, which has more effect upon the scale stages, but DDT can be relied upon to give good control if two applications are made, usually at ten-day intervals, although this depends on environmental conditions. DDT has proved of great value in preventing serious losses of rose and carnation flowers caused by thrips feeding on the partially opened blooms. It also effectively prevents the malformation of chrysanthemum flowers due to capsid injury.

Cucurbits are the outstanding species of plants intolerant of DDT. This susceptibility to damage does not extend to the roots, and experiments at Cheshunt in the early days of DDT showed that excellent control of woodlice was obtainable by watering the cucumber beds with 0·05 per cent DDT.

DDT undoubtedly has several of the properties required of an ideal insecticide: low mammalian toxicity; lengthy residual toxicity; and, with a few exceptions, safety to plants.

The discovery of the insecticidal properties of BHC and DDT occurred at almost the same time The two insecticides will control broadly similar ranges of insects, but, in general, BHC is less effective against lepidopterous caterpillars, and more effective against aphids. The mottled arum aphid (*Aulocorthum circumflexum* Buckt.) is the only aphid species of economic importance to glasshouse growers which is not susceptible to BHC. BHC is less persistent on leaves than DDT, presumably because of its greater volatility. This volatility, however, may be a reason for its greater power to penetrate leaves and so control pests such as leaf miners, which live within the leaf tissue of tomatoes, chrysanthemums and other plants.

The absence of taint problems in normal glasshouse crops permits the use of mixed-isomer BHC, as an alternative to aldrin, to control wireworm where glasshouses are newly erected on grassland. When the insecticide is applied to the soil immediately surrounding the plants, as in the control of springtails attacking lettuces, or symphilids feeding on the roots of newly planted tomatoes, formulations of the gamma isomer (lindane) should be used, because this is less toxic to plants. Nowadays it is usual to replace mixed-isomer BHC by gamma BHC for all purposes.

Recent experiments by Hussey, Wyatt and Hughes[1] at Littlehampton have shown that gamma BHC at 50 p.p.m. (1¾ oz per ton) of compost will decrease and delay the population increase of cecids without reducing mushroom yield. The chemical can be applied to the compost as either a dust or an emulsion before peak heating, and still remain effective during the greater part of the cropping period. Further work (Hussey and Wyatt[2]) showed that either aldrin or gamma BHC, incorporated in the casing layer at 10 p.p.m., prevents the spoilage of mushrooms by acting as a barrier when cecids migrate from the compost to the mushroom caps. Because spent mushroom compost containing BHC may cause tainting of sensitive root crops when used as manure on horticultural land, aldrin appears preferable.

Aldrin and dieldrin are not much used at present on glasshouse crops.

Work by Mason[3] has shown that aldrin or dieldrin dust, incorporated in potting compost, prevents vine weevil attacks, and is more effective than DDT or BHC for this purpose. Aldrin and dieldrin have been found very effective against ants, and have given promising results against earwigs.

Organo-phosphorous compounds

An account of the use of organo-phosphorous compounds for the control of glasshouse pests may be simplified by their subdivision into two groups: the systemic compounds, which can be absorbed by the leaves or roots of plants and translocated to other tissues, making them toxic to susceptible pests feeding upon them; and the non-systemic compounds in which this property is lacking, or insufficient to be of practical value. New compounds in each group are being introduced so frequently that critical investigations of their relative merits for controlling various pests on different hosts cannot keep pace.

1. The systemic chemicals

Schradan, one of the first synthetic systemic compounds to be used for pest control, has largely been superseded by more recent compounds, and is now rarely used in glasshouses except for the control of susceptible races of red spider mite on young cucumber plants. The less poisonous systemic compounds, demeton-methyl and dimethoate, are also used for this purpose. It is obviously necessary to ensure that cucumber fruits do not contain residues of systemic pesticides dangerous to the consumer, and the period which must be allowed between application and marketing fruits is stipulated in official recommendations. The same considerations apply to all edible produce. Systemic organo-phosphorous chemicals are of great value to growers of ornamentals, where residues are not a danger to buyers of the produce.

The value of some systemic compounds for the control of red spider mite and aphids on carnations has been investigated at Littlehampton. Preliminary experiments showed the superiority of the systemic compounds demeton-methyl and schradan in comparison with contact insecticides, when the plants were in active growth. Demeton-methyl gave the better result under less favourable conditions of plant growth, and was very widely adopted by carnation growers. Recent work included tests with demeton-methyl, morphothion, phosdrin and Thimet applied as soil drenches and high volume sprays for the control of red spider mite. The speed with which these compounds gave control, and the persistence of the control, were examined on well-established plants during the early summer and throughout the winter. When applied in the summer as soil drenches at equal concentrations, demeton-methyl, dimethoate and Thimet killed all the mites over periods of eighteen, twenty-one and thirty-five days respectively. With applications at the same rate in the winter, 100 per cent mortality was not obtained with demeton-methyl or dimethoate drenches, but was given by Thimet after an "uptake" period of six weeks. Phosdrin and morphothion were unsatisfactory for the control of red spider mite when applied as soil drenches to carnations. When the same insecticides, and also disyston, were applied as sprays, all were effective at 0·04 per cent. Dimethoate and demeton-methyl were

somewhat more efficient than the other compounds at 0·02 per cent, and under the conditions of the tests were more persistent.

More information is required on the effects of cultural conditions on the relative values of various systemic compounds against pests, and of the persistence of their insecticidal action on different plants. Although systemic compounds can be used without damage to a wide range of plants, some varieties of chrysanthemums are susceptible to injury by demeton-methyl and dimethoate sprays. The application of demeton-methyl *to the soil* has not damaged chrysanthemums, but dimethoate drenches cause injury. Morphothion appears safe and effective for the control of aphids on chrysanthemums.

It should be noted that liquid formulations of Thimet are not at present commercially available.

2. *Non-systemic compounds*

Although the rapid conversion of TEPP to non-poisonous compounds was a useful feature, this insecticide was replaced almost entirely by parathion, which in turn is being largely replaced by related but less poisonous compounds. The merit of parathion was its powerful action as an acaricide and its low phytotoxicity. This made it valuable for the control of glasshouse red spider mite on cucumbers, when applied alone or in combination with azobenzene or chlorfenson. Investigations begun at Cheshunt and continued at the Glasshouse Crops Research Institute showed that cultural operations on plants previously treated with parathion aerosols or smokes did not endanger the workers. The rapid development of parathion-resistant mites on cucumbers in the major producing areas has greatly reduced its value. Its use for the control of symphilids attacking the roots of tomatoes, and sciarid larvae attacking cucumbers and other plants, is well established, and no other non-systemic organo-phosphorous compound has been shown to be superior for the treatment of eelworm-infested chrysanthemum cuttings. Although widely used in some regions against root knot eelworm on tomatoes, parathion at 0·04 per cent watered on to tomatoes growing in an infested soil provides a palliative and not a cure.

Malathion is a safer alternative to parathion for most purposes. Its low mammalian toxicity allows its application under glass untramelled by the protective clothing needed when parathion is applied, but it is insufficiently active to be of practical value against red spider mite, and cannot be used in smokes because it is too readily decomposed by heat. Nevertheless, malathion is very effective against white fly, aphids and thrips, and is particularly useful for the control of these pests on cucurbits as these plants are somewhat susceptible to damage by BHC. Certain plants which may be grown under glass are sensitive to malathion; cases of damage to roses, antirrhinums, and petunias have been observed, and manufacturers issue warnings regarding other plant species.

Diazinon, as an aerosol, will give good control of races of red spider mite which are not resistant to parathion, but there is evidence that parathion-resistant races, even though initially susceptible to diazinon, rapidly produce diazinon-resistant races. Young cucumber plants, and certain varieties of chrysanthemums (particularly all-the-year-round types), are sensitive to dia-

zinon. Less is known about a number of new non-systemic compounds which are not yet available commercially, but it seems unlikely that they will control, or continue to control, parathion-resistant races of mites.

Acaricides

Substances which kill mites (acarines) are termed acaricides, and under this heading only compounds which destroy mites and have little effect on insects are mentioned. The early post-war progenitor of more potent compounds was azobenzene; the other compounds were discovered by a series of modifications of its basic chemical structure. Fenson was developed as the result of joint work at Cheshunt and East Malling Research Stations, and the more expensive but less phytotoxic chlorfenson originated in the U.S.A. Fenson became the most widely used product for the control of red spider mite on tomatoes and carnations in Britain, and remains extensively used on tomatoes. Systemic pesticides giving control of both aphids and red spider mite have largely replaced it on carnations.

Although fenson can be applied to a fairly wide range of glasshouse crops without causing injury, it cannot be regarded as a very safe acaricide. Cucumbers are very susceptible to injury, and fenson also damages beans, vines, roses, and several varieties of chrysanthemum. Chlorfenson is rather less harmful to cucumbers, but causes some damage when used in effectively acaricidal amounts. Mixtures of chlorfenson and parathion were used satisfactorily before organo-phosphorous resistant races of spider mites were predominant on this crop.

Chlorbenside is another very effective acaricide suitable for aerosol or spray application to a wide range of crops, but it too is injurious to cucumbers. Two more recent introductions, "Kelthane" and "Tedion", are tolerated by established cucumbers, and the former is extensively used by cucumber growers who cannot obtain control with organo-phosphorous compounds.

When compounds are applied as aerosols, the deposit falls almost entirely on the upper surfaces of the leaves. It is important when non-volatile chemicals are used that this deposit should penetrate the leaves to affect pests living on the undersides. This property of penetration is very marked with fenson.

Need for new compounds

Apart from the compounds within the groups already described, few other new insecticides have been discovered, and none of these has an established place in the range of compounds at present used to control glasshouse pests. One chemical of a different group, useful for the control of red spider mite on cucumbers, has had to be withdrawn owing to doubts regarding its long term effects on humans.

Derivatives of fluoracetic acid have systemic insecticidal action, and fluoracetamide is the active principle in a commercial product. So far, no critical work with this compound has been undertaken at Littlehampton, but preliminary trials showed that it lacked acaricidal action. This is unfortunate, since chemicals which have a different biological action from the types previously described are urgently needed, to combat the present widespread

infestation of glasshouse crops by mites resistant to organo-phosphorous compounds and suspected of being resistant to the persistent acaricides.

At present many cucumber growers find the new pesticides of little avail, and they obtain control with petroleum emulsion sprays, first introduced to the glasshouse industry in this country in 1927. Further new chemicals will undoubtedly be found, and it is hoped that studies on the problems of resistance of mites will enable growers of glasshouse crops to obtain the same degree of control of this pest, as can be obtained using the new compounds against most other pests.

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John Curtis's Farm Insects

H. C. GOUGH, B.Sc., PH.D., D.I.C.
Cambridge

John Curtis's observations on insects were careful and detailed, and his drawings accurate and beautiful. Some of his maxims are still guiding principles of agricultural entomology.

IT is just a hundred years since the publication of a book by John Curtis, F.L.S., with this imposing title: *Farm Insects: Being the Natural History and Economy of the Insects Injurious to the Field Crops of Great Britain and Ireland, and also those which infest Barns and Granaries. With suggestions for their destruction.* The book could hardly be expected to excite the attention which Darwin's *The Origin of Species* had in the previous year, nor was it likely to have the same profound effect on scientific thought, but in a quiet way it surely had a marked influence on future work on insect pests, not only in this country but throughout the world.

John Curtis was born in Norwich in 1791, and died in 1862. According to L. O. Howard's *History of Applied Entomology*, even at the age of four he loved plants and animals and had begun to collect butterflies. After a short time in a solicitor's office he became curator of an amateur entomologist's collection, and through his employer became acquainted with the leading entomologists of London. A competent draughtsman, he produced many accurate and beautiful drawings of insects which are still a source of admiration to naturalists. He was associated with the *Gardener's Chronicle* from its early days, and under the name "Ruricola" published articles on various crop pests. Subsequently he was invited by the Council of the Royal Agri-

cultural Society to prepare a series of reports on the insects affecting the various crops cultivated in the British Isles. These reports appeared in the Journal of the Society at intervals from 1841 to 1857, and formed the basis of his book.

Care and accuracy

A present-day entomologist picking up the book is first impressed by the very accurate and excellent engravings; on delving into the text he admires the careful and detailed original observations on habits and life history, most of which are still valid though naturally incomplete. Even more outstanding is Curtis's informal enunciation of maxims which still are the guiding principles of agricultural entomology. Some of these are formulated in the introduction; others are introduced casually throughout the text. For example his emphasis on accurate identification: "If insects be not thus accurately and scientifically described, and their names carefully learned, the facts noticed by practical observers are generally worthless, and may tend to mislead, by the confusion of one species with another, and the consequent adoption of improper remedies." And on the subject of identification there can be few modern workers who do not echo his heartfelt footnote on the work of the systematists: "Schönherr, with his usual mania for superseding established names, has changed this (*Calandra*—the grain weevil) to *Sitophilus*." It is a fitting comment that the grain weevil is once more *Calandra*, and since I first drafted this sentence I have seen an official recommendation that its name be changed back again.

"Practice with Science"

His demands for more observation and more knowledge still apply. ". . . I fear it is not by the experiments of a few philosophic men that we can hope to discover any positive antidote to so great an evil (flea beetles). We want correct data from every sort of soil under the various influences and effects of cultivation before we can fairly grasp the subject. Until we became acquainted with the economy of the beetle we were groping in the dark." And again, "Before attempting to wrestle with such insidious enemies, three things are most essential—knowledge, industry and perseverence . . . 'Practice with Science' in every department of agriculture, must lead to useful results." And how many entomologists have begun an article or talk with words like these? "The first step towards vanquishing an enemy is to ascertain correctly his habits; the next, to be so certain of his appearance as not to mistake one party for another; and a third and no less important object is to be well acquainted with our allies and friends."

John Curtis was one of the first men to emphasize the importance and recognize the limitations of natural enemies, for as he remarks ". . . It is a wise dispensation of Providence to keep every animal in check by some other . . . This natural process, though never failing, is often too slow in its operation to secure immediate relief; the farmer must, therefore, devise means, if possible, for the more speedy destruction of the enemy".

On general life history, description of damage and habits, the information he gives is not so very different from that in modern text-books, apart from

the discursive and anecdotal style of the day. It is in its control measures that the differences are really striking, with soot, lime, gaslime and tarry compounds predominating, though it is not so many years since we were still dependent on such alleged remedies—and even now they die hard. This is a typical recommendation for the control of carrot fly: "Take a barrowful of sand and pour a gallon of spirits of tar upon it by degrees, so as thoroughly to incorporate the whole mass, with the hands, then sow it over the surface of the field intended for carrots. The above quantity will be enough for sixty or seventy square yards."

Hand-picking of pests

In those days of large families and cheap labour, hand-picking of pests was a common practice, as on three acres of wheat attacked by wireworms at Hounslow in 1846. "The dead plants were dug up with square pointed knives, and the wireworms picked from the roots into small jugs; at the end of every two rows they were emptied into a large jar, from which escape was impossible. The total quantity taken and destroyed in this manner, from the three acres alone, was more than 60,000; the expense of collecting them trifling, being not more than 10*d*. per 1,000, at which price the women can earn good wages. The ground was gone over two or three times, and the worms were counted every night." When caterpillars of the death's head hawk moth were attacking potatoes he said: "The noble larva of this moth is occasionally abundant in potato grounds, sufficiently so lately to induce the peasants in Kent to collect and give them to their poultry."

Biological control was also a firm favourite, as the following examples, all dealing with turnip sawfly, show: "Pigs will destroy the larvae to a very great extent, and without injuring the crop in the slightest degree." "At Chertsey, a farmer put 150 half-grown fowls into a waggon, which was drawn into the middle of a cankered field, and turned them loose, where they soon annihilated the caterpillars." His recommendations were often accompanied by a wealth of practical detail: "Nearly 400 ducks were at work at one time on two farms in Norfolk, and saved all the crops intrusted to their care. When such large numbers are employed, they ought to be formed into detachments of not more than 100, and each must be attended by a boy or girl, to precede them with long light pole or willow rod, to brush the caterpillars off the leaves, as well as to drive the birds to water and to rest three or four times a day; after drinking, the ducks will often disgorge the caterpillars in great quantities, and soon go to work again with whetted appetites."

Anticipation of future work

It is fascinating to browse through this book and come across casual observations which anticipated future work. During the ploughing up campaign of the second world war, the prevalence of wireworms after sanfoin was noted in the Eastern Counties and contrasted with the small numbers found after lucerne. One hundred years ago John Curtis made the following remark: "It is the practice in chalky districts to sow sanfoin, which is kept down for some years; and when the land is again broken up it is sure to yield a plentiful crop of wireworms." The following statement also could

justly be made by any advisory entomologist today. "Economic entomology, or a knowledge of those insects which injure cultivated crops, is so vast a field of discovery, that every season brings forth fresh subjects for investigation; and although this arises in great measure from the neglect which has attended this important department of natural history, it seems as if a cycle were revolving, which exhibits species previously unobserved, at intervals of greater or lesser extent; and whether regular or irregular cannot be determined for want of data." How little real progress we have made in a century! And if John Curtis was right about the wheel turning I can still look forward to the day when I am called in to deal with an attack of caterpillars of the swallowtail butterfly on carrots!

Abbots Ripton Estate

C. W. ROWELL, C.B.E., N.D.A., F.R.I.C.S.
Cambridge

Starting in 1932, at a time of severe agricultural depression, the present Lord de Ramsey has built up the Abbots Ripton Estate into a flourishing and happy enterprise.

THE Manor of Abbots Ripton, which is in Huntingdonshire, was granted to the Abbot of Ramsey some time in the tenth century. One wonders why the two estates were linked together, for they are 6 miles apart across the fens. In those far off days the abbey was on an island, surrounded by the marshes and swamps of what is now the fertile fens, and it seems a reasonable guess that the Abbot needed timber, and needed it badly, for building and firing. The Manor was then largely woodland, most of it oak, and would provide the trees that he required and the cheap labour to haul it. Since that time the two estates have always run together.

The tenants of the Manor were copyholders held of the Abbot of Ramsey, but at the Dissolution (in 1541) the manor was granted by the Crown to Sir John St. John, and the tenants had reason to regret the change. He set about increasing rents, disputing their copyhold rights, and taking them to law in an effort to dispossess them of their privileges—such as wood cutting. There followed considerable poverty, and many of the houses fell into decay, although whether Sir John was responsible for this is not clear. In any case, he disposed of his property, and several changes of ownership ensued, including one owner having the odd name of Julius Caesar. In 1794 the estate was acquired by Guy Henry Fellowes, a rich city merchant, in whose family it has remained ever since, with the sister estate in Ramsey. The peerage was created in 1887 and the title assumed of Lord de Ramsey.

The 1930s

In 1932, on his return from abroad, the present Lord de Ramsey found himself in possession of Abbots Ripton at a time of great agricultural depression. The farming industry was in a parlous condition, and so was the estate. Half the farms were untenanted and could not be re-let, even rent free. Much of the land was derelict, and fields were becoming overgrown with thorns. The whole estate was rabbit-ridden, and the unlet land was "farmed out".

The soil is a heavy intractable clay, difficult and expensive to work, and at that time a great deal of it in East Anglia was going out of cultivation; because of the low rainfall, it does not make good pasture, and is therefore not suitable for "dog and stick" farming—the usual way of meeting bad times in the country.

With this depressing outlook it is not surprising that Lord de Ramsey, only twenty-two years old and without farming experience, was inclined to sell the estate. He had an offer of £6 10*s*. an acre and would have accepted £7, a figure at which land was then being bought for afforestation. Fortunately, as things turned out, he changed his mind and decided to try his prentice hand at farming. It must have required great courage at his age to tackle such a large and unpromising area in bad times. The seven unlet farms totalled nearly 2,000 acres, and this has been in hand ever since. Things turned out well; from the first harvest the enterprise paid its way, and the farms never looked back. But his Lordship insists that this was because he had a first-rate bailiff, "a whale of a fellow", as he says.

At the present time the estate must be worth well over £60 an acre. Rents average 65*s*. an acre, as against 10*s*. before the war, so great has been the recovery in the value of this cold clay land since horses gave way to crawler and other heavy tractors. Power farming has made all the difference to the handling of this heavy soil. A farm on the estate recently offered by tender received bids of up to £6 an acre. Lord de Ramsey feels that rents have now reached a realistic figure, and provide a sufficient return to ensure that homesteads and cottages are properly maintained. This is certainly the case on his own estate, where all the buildings are in good order.

Every effort is made to preserve the character of the village, with its seventeenth-century cottages. They are being re-thatched, and timber is being used for new buildings to tone in with the rest of the village. Asbestos cement, useful as it is, is being kept well in the background.

It is of interest to compare the present rent of 65*s*. an acre with the total rent of the whole estate at the time of the Dissolution, when it was only £39. Going back even further, the rent of the manor when the survey was made in 1086 was £8. Times and money values have indeed changed.

Steady improvement of buildings

The cottages on the estate are being modernized, and advantage is being taken of the grant aid which is available for this purpose. For example, a pair of two-bedroomed cottages at Wennington Manor Farm have been thrown together and formed into one excellent dwelling with a large living

room, parlour, kitchen, four bedrooms, downstairs bathroom and lavatory, hot water system, and sewage disposal to a septic tank. This has cost £783, or £422 after deducting the local authority's improvement grant. In comparison a pair of new timber cottages which the estate has built recently cost over £5,000. Another pair of wattle and daub cottages is being improved, with additional and larger windows and plumbing and sewage disposal, at a cost of £1,100 after deducting grant.

The homesteads are also being brought steadily up to date, usually with the financial help of the Farm Improvement Scheme, and each set of farm buildings is being adapted for a single specialized purpose. The main homestead handles the whole of the grain, and has facilities for drying and storing and for mixing rations. The pea viner is also there, handy to the whole of the farmed area. Another of the homesteads is adapted for rearing calves, and is referred to later. The hub of the farming is the large machinery shop and the new tractor and implement sheds. These are new buildings, in timber, and have cost £1,950.

Still another set of buildings is now a pig fattening unit. It consisted of a typical East Anglian layout of stabling, shedding, boxes, etc., on two sides of a square yard, with a large barn forming the third side. The barn is now used as a food store and mixing floor, and the remainder of the buildings have been converted into pig boxes and pens. Weighing arrangements are in the centre of the yard. A modern mechanized piggery has been added recently, bringing the total capacity of the unit to 800 pigs, with an annual output of over 2,000 a year. A particularly interesting adaptation of one of the ranges has been worked out in co-operation with the Agricultural Land Service; by adding covered yards to the front, the building now holds 200 pigs in a length of only 120 feet, and the yards can be mucked out in one stretch by tractor. The whole cost, including insulation, worked out at only £7 a pig.

Other items of fixed equipment have not been neglected. Several miles of farm roads have been hardened, and there is now good access to most of the fields. The process began shortly after the war, when concrete from air raid shelters became available for hard core, the work of dismantling being appropriately carried out by prisoners of war. When this supply became exhausted, the concrete from runways on redundant airfields was bought from demolition contractors and is being used as a base. Topped with gravel as dug, it makes a long-lasting road on this sticky land. The cost works out at 13*s.* 5*d.* a yard run ten feet wide, as compared with the standard cost under the Farm Improvement Scheme of 15*s.* a yard run for a road nine feet wide.

Farming for the long term

The land in hand covers 1,954 acres, and of this 85 per cent is under the plough. The management would be described as mixed farming owing to the many important side lines, but the main accent is on arable. Unlike so many farms on the east side of England, the policy is to avoid too much corn, and two successive white crops are rarely taken. This is by no means easy now that roots are no longer fed. The position is met at Abbots Ripton by growing large areas of sugar beet, potatoes, peas, timothy and fescue for seed, and shorter leys. In this way only half of the acreage is under corn. Most of the

straw goes back into the land. Lord de Ramsey, like the writer, feels that in the long run this is essential to preserve the fertility and workability of the soil, and he is farming for the long term. To take a liberty with an old adage, "corn and corn without manure makes father rich and son poor". A great deal of farmyard manure is made; it does not go very far with such a large arable area, but the vegetable matter content of the soil is kept up by the leys, which occupy 23 per cent of the farm.

The leys also help to keep wild oats under control, which are such a pest on this heavy land. Cuckoo Pastures Experimental Husbandry Farm at Boxworth has shown their value in this direction; after the timothy and fescue are ploughed up at the end of four or five years the wild oats are usually so few that the crop can be rogued.

Wood-pigeons are another East Anglian pest, and can play havoc with the peas. At Abbots Ripton the answer seems to be "bangers", moved from time to time, and a twice daily visit by a man with a gun. This may appear expensive, but an expenditure of £50 does not seem too big a price to pay for safeguarding a crop that may be worth £500. The peas are vined on the farm for a canning firm. When they cannot take them quickly enough, the peas are dried on tripods for seed.

Livestock

A 40 cow Friesian herd is kept on more or less orthodox lines. A Friesian bull is used, except on the heifers, where an Aberdeen-Angus is substituted for easy calving. As an adjunct, twelve to fifteen nurse cows are kept, which rear 120 calves, bought in in the autumn when they are at their cheapest. The system employed is unusual; old boxes have been converted to hold eight of the calves, which are put into a pen in the box while two nurse cows are brought in and tied up. They are then liberated to suckle. It must require considerable stockmanship to see that each one gets its share, but the idea seems to work in practice. In the summer, the same boxes are used for sows and litters brought in from grass when the piglets are ten days old. This preliminary period at grass seems to give them a good start. The change of use in the buildings from cattle to pigs is said to give good control over disease.

As is evident, the farm is run on strictly business lines: there is no suspicion of "hobby farming" here. Wireless transmitters on the three Land Rovers may seem a luxury, but in fact they are a worthwhile aid to the management, and not toys.

Farming methods do not stand still, and the farms act as a laboratory to try out new ideas—not all of which are successful of course. Potato silage, for example, was used to dispose of surplus and chats, but was given up because of the labour involved in boiling. Raw potatoes are now fed, mainly to the 200 sows, who dispose of three-quarters of a ton a day. Single calf rearing, using Aberdeen-Angus cows, was also abandoned in favour of the multi-suckling system already described. Another experiment was the use of the New Zealand farrowing pen. The three that were made are still in use, but they are not regarded as an unqualified success. The prototype machines of a harvesting company are tried out on the estate: Lord de Ramsey is a director of the company.

Good labour relations

The farm keeps twenty-three men and five women permanently employed, and uses casual labour for pea picking, etc. Good labour relations are of first importance on this, as on all well-run farms, and the team are willing to work long hours without pressure when this is needed. They even adopted three-times-a-day milking for some years—a real test of zeal on the part of the cowmen. Overtime is not discouraged when there is a rush job to be done. The owner tells his men, "If you'll work, we'll pay", and they do! When I visited the farm, harvesting was still in progress at 8 p.m., and everybody was hard at it—tractor drivers, pigmen, gardeners, the lot! Even taxation at 7*s.* 9*d.* in the £ does not prove a discouragement to overtime at Abbots Ripton.

Replanned Farrowing Facilities for Auchincruive

J. M. THOMSON, N.D.A., N.D.D.
J. WALKER-LOVE, M.S., B.SC.(AGR.), N.D.A., N.D.D.
and
R. J. FORSYTH, D.A.(GLAS.), A.R.I.B.A., A.R.I.A.S., M.INST.R.A.
West of Scotland Agricultural College, Auchincruive, Ayr

The West of Scotland Agricultural College is testing the latest pig farrowing house and system against more conventional methods, to give piglets the greatest chance of survival with the minimum attention in the critical days immediately after birth.

THOSE familiar with the pig farrowing unit at Auchincruive in the past will find it with a new look on their next visit. Large-scale alterations have been made to the old farrowing house, and two new buildings have appeared in recent months. These are the result of a carefully thought out plan, the object of which is to provide better housing conditions for the sow and her litter and in turn, through more piglets weaned per sow, better profitability. Time will tell how successful these houses have been, and in the meantime this opportunity is taken to put on record the various stages of development and to bring out the underlying principles.

The farrowing house as it existed previously had been built on the Danish pattern, in so far as it had a central feeding-passage flanked on either side by a range of pens—each pen having direct access to a common dunging passage between the pens and the external walls. Here the similarity ended. Unlike the true Danish house, there was no loft above to conserve heat within the house. Although the floor and roof were to some extent insulated, the walls were thin and the roof was unnecessarily high. A vast expanse of

single-sheet roof glazing served to drain away any warmth which might otherwise have accumulated, and a cold and draughty building resulted.

In recent years, attempts have been made to improve conditions by fitting independent low ceilings over the pens and creeps; also by installing artificial heating units within the creeps themselves. It was then found, however, that the piglets were being exposed to a wide range of temperatures (closely linked with outside temperature readings). Such conditions, it was thought, could not be expected to give the high number of piglets weaned which the trend in pig economics now demands, and which may be even more necessary in the years that lie ahead. It was just such thoughts, plus an acute awareness of the national piglet mortality rate, which prompted thorough investigation of the conditions then prevailing, and the subsequent consideration as to how such conditions might be improved.

It is not implied that the whole answer to reducing mortality lies in farrowing accommodation; for example, low birth weights have a close relationship. Records from a large number of pig herds show an average mortality of 27 per cent, with a range from 22 to 34 per cent. The summer mortality figure (April–September) is usually not as high as that recorded in the winter. Of these deaths, 70 per cent occurred in the first week after farrowing, and almost 50 per cent occurred before the piglets reached three days of age. There is another aspect of this problem: the larger the litter at birth the higher the mortality is likely to be in that litter. Have those producers breeding for large litters to accept higher mortality?

Crate-type house with periodic resting chosen

With this in mind, it was decided to provide a new farrowing house which would allow piglets a maximum chance of survival with a minimum amount of attention in the apparently few critical days immediately following birth. However, before ideas became bricks and mortar, a tour of inspection was made of many new and old farrowing units throughout the country. Whilst evidence gleaned from this exercise weighed strongly in favour of the crate-type house, its limitations were also recognized. Perhaps the least attractive feature of this system lay in its intensity of use, with the attendant increased disease potential. Thus, whilst the crate-type house was favoured, complete separation of individual compartments was thought essential, to promote strict periodic "resting" of the crates, as an integral part of the system in combating possible build-up of piglet scour troubles.

While this choice has been made with confidence, it was considered that here was an opportunity to compare this crate system with the more conventional farrowing pen. The Agricultural Research Council, through a grant, have made this comparison possible. The word "system" is used advisedly, as there are so many variables associated with each farrowing house that on the one hand it would be incorrect to make a direct house comparison, and on the other, impossible to break these variations down for comparison in any one herd in a reasonable period of time. As it is, the comparison of the two systems will be based on a minimum of three years' working experience.

Apart from the use of the farrowing crate, the new house has been designed to keep as even a temperature as possible, whilst provision is made to enable

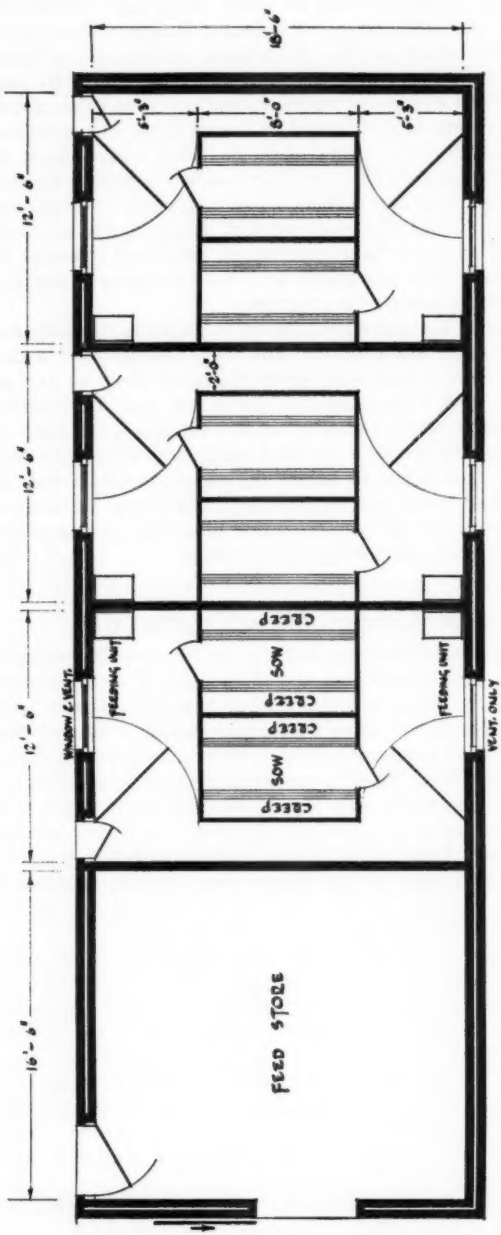


Fig. 1. Plan of crate-type farrowing house.

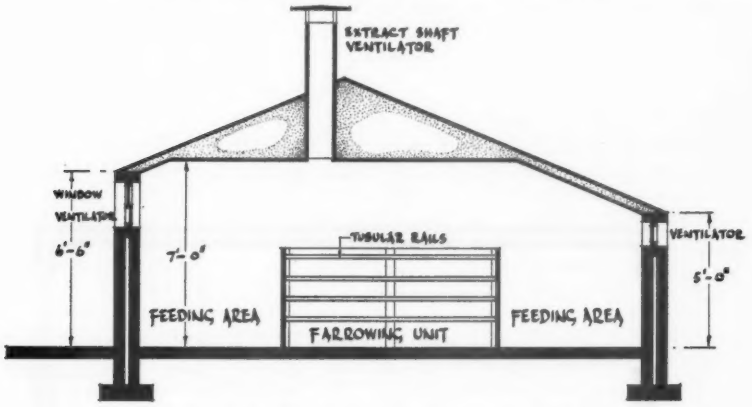


Fig. 2. Section of crate-type farrowing house.

2-crate compartments to be rested from occupation in rotation. Recent work suggests that piglets require, above all, a reasonably even temperature. To this end, the house is insulated throughout. Bedding areas are insulated by means of hollow blocks laid on a bituminous damp-proof course, and covered by a suitable cement screed. A low ceiling (7 feet high) of 1½-inch polystyrene glued to a suspended frame-work insulates the living quarters from the cold roof space above. Windows are double-glazed, and 11-inch cavity-walls are filled with a completely new plastic-foam insulant which markedly increases their heat-conservation qualities.*

The resting programme will be possible since the crate house at Auchincruive is divided internally into three separate but identical compartments (see Figs. 1 and 2). Each compartment contains two farrowing crates, to which the sows are rigidly confined, except at feeding times when they are allowed access to individual feeding-cum-exercise areas. As a further precaution, each compartment is equipped not only with 325-watt creep lamps, but also with space heaters which are thermostatically controlled to cut in if the temperatures at piglet level fall below 68°F. A 6-inch diameter fan working in conjunction with shaft ventilation is also thermostatically controlled, the aim being to achieve the fewest air changes per hour consistent with a wholesome atmosphere in the piggery.

The crate consists of 1¾-inch diameter, horizontal metal tubing fitted into an outer wooden frame, which in turn forms the creeps on either side. A removable rear cross rail is used at farrowing time, and for the following two days, to ensure that the sow is kept forward in the crate.

The sows are being kept in the crate house for ten days after farrowing, after which they are moved to a rearing house for the next six weeks. The rearing house (the previous farrowing house altered) is now in two sections, each with six conventional pens with creep area and rails. This house is also equipped with thermostatically controlled heating and ventilation, but the temperature aimed at is considerably lower than in the crate farrowing house,

* New Approach to Insulation. R. J. FORSYTH. *Pig Farming*, May 1960, 41–3.

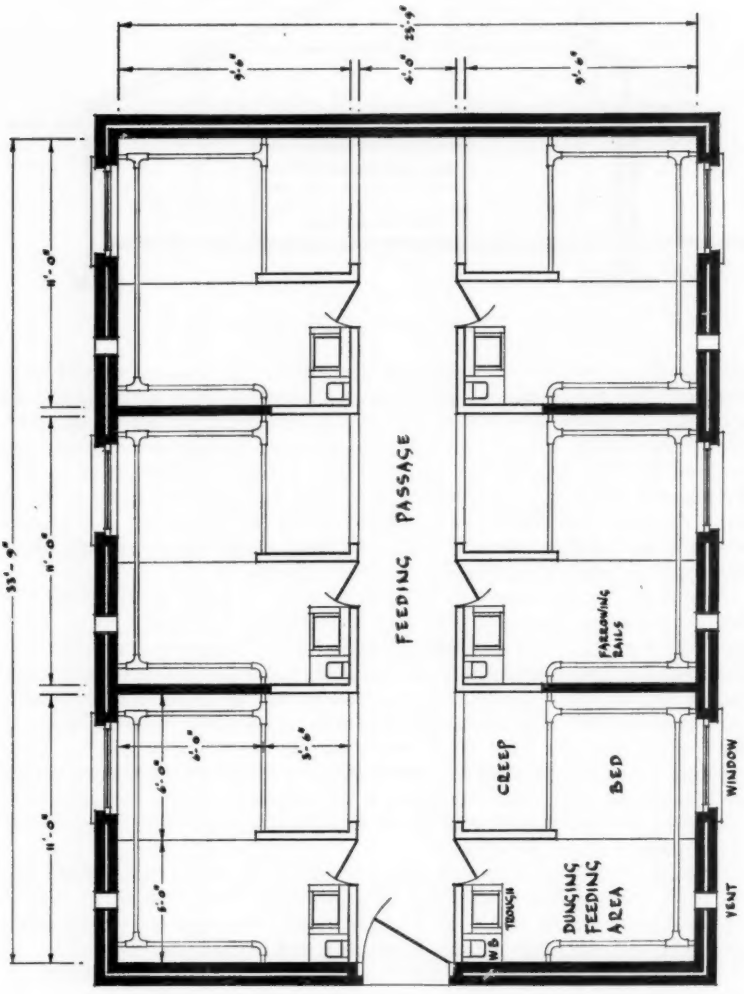


Fig. 3. Plan of standard farrowing house.

to harden the piglets off before they are transferred to the fattening house. The layout of the rearing house also lends itself to regular rest periods.

Standard house system

Our standard house is being used as a conventional yardstick by way of comparison, and is constructed along sound modern standards now generally being applied for farm open pen farrowing. The building is free-standing, on a site adjacent to the crate house, and it contains six pens—a range of three on either side of a central feeding passage (see Figs. 3 and 4). Each pen com-

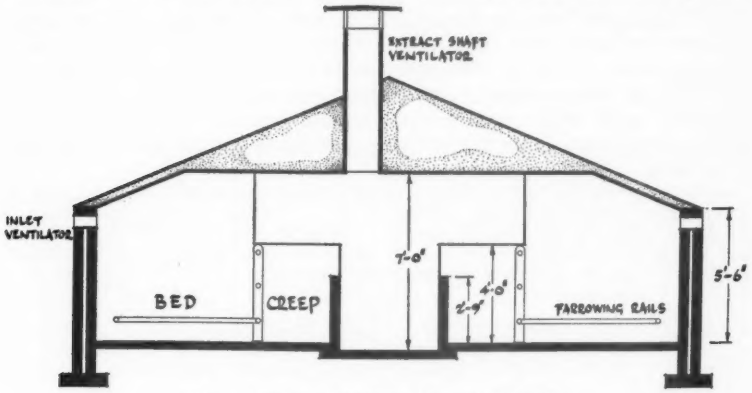


Fig. 4. Section of standard farrowing house.

prises a creep, sow bed and dunging-cum-feeding area. The house is insulated to normal standards, having cavity walls and a suspended ceiling of 1½ inch-thick polystyrene. The ventilation consists of one inlet ventilator in the external wall opposite each dunging area, and these operate in conjunction with a central shaft outlet ventilator.

Under this system the sow will remain in her pen with her litter until weaning.

Cost

It is difficult to make a straight comparison of building costs between the two farrowing systems, as one house accommodates the sow and litter for only ten days, whereas the other does so for eight weeks. However, taking into consideration the difference in throughput, and estimating the cost of providing new rearing accommodation, it is calculated that on a sow basis the crate system will work out in the region of £90, against a comparable figure for the pen system of £80. This represents the difference in facilities provided between the two houses, and the provision of sufficient accommodation to pursue a strict resting routine. We shall have to wait to see whether the extra cost of the crate system can be justified. Such a difference can mean at least 10*s*. more on the cost of rearing a litter, but on the other hand, the number of piglets reared does not need to be raised by very much to more than cover such an amount.

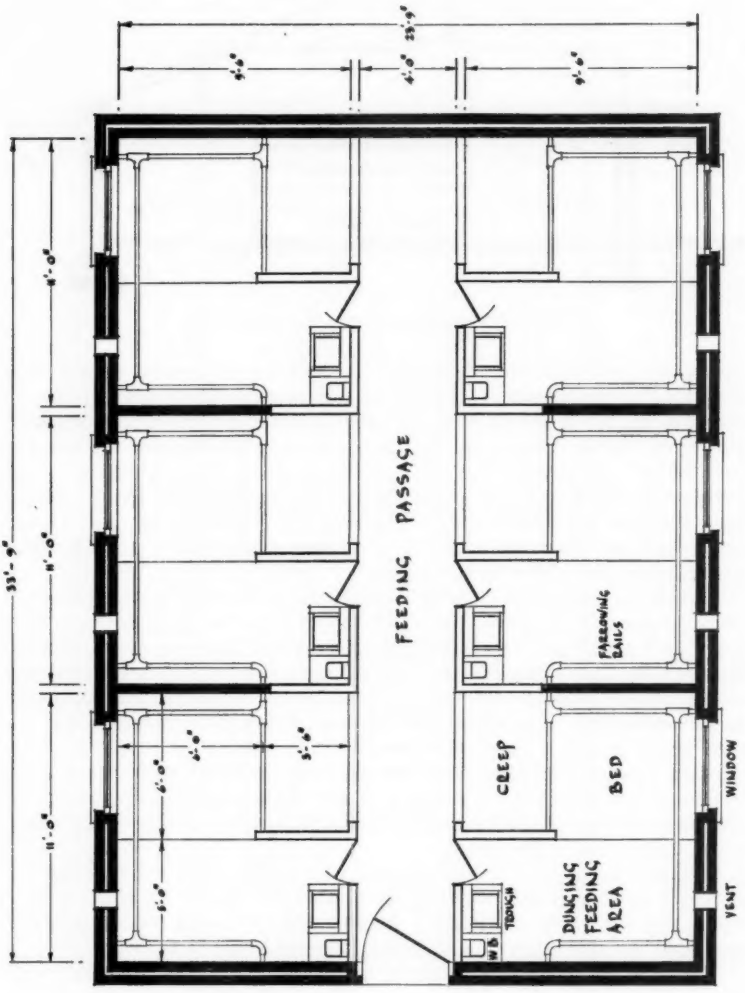


Fig. 3. Plan of standard farrowing house.

to harden the piglets off before they are transferred to the fattening house. The layout of the rearing house also lends itself to regular rest periods.

Standard house system

Our standard house is being used as a conventional yardstick by way of comparison, and is constructed along sound modern standards now generally being applied for farm open pen farrowing. The building is free-standing, on a site adjacent to the crate house, and it contains six pens—a range of three on either side of a central feeding passage (see Figs. 3 and 4). Each pen com-

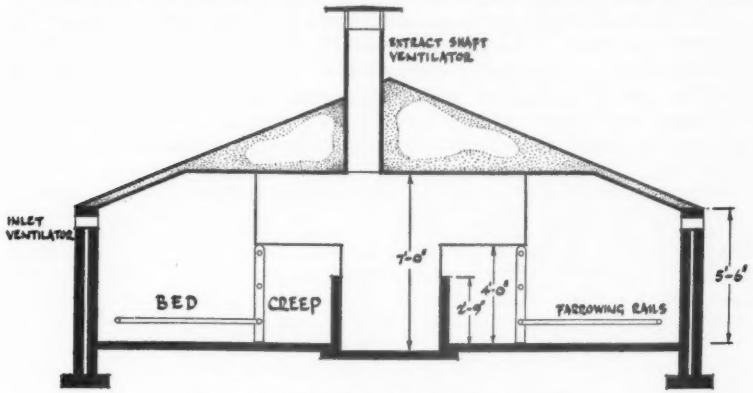


Fig. 4. Section of standard farrowing house.

prises a creep, sow bed and dunging-cum-feeding area. The house is insulated to normal standards, having cavity walls and a suspended ceiling of 1½ inch-thick polystyrene. The ventilation consists of one inlet ventilator in the external wall opposite each dunging area, and these operate in conjunction with a central shaft outlet ventilator.

Under this system the sow will remain in her pen with her litter until weaning.

Cost

It is difficult to make a straight comparison of building costs between the two farrowing systems, as one house accommodates the sow and litter for only ten days, whereas the other does so for eight weeks. However, taking into consideration the difference in throughput, and estimating the cost of providing new rearing accommodation, it is calculated that on a sow basis the crate system will work out in the region of £90, against a comparable figure for the pen system of £80. This represents the difference in facilities provided between the two houses, and the provision of sufficient accommodation to pursue a strict resting routine. We shall have to wait to see whether the extra cost of the crate system can be justified. Such a difference can mean at least 10*s*. more on the cost of rearing a litter, but on the other hand, the number of piglets reared does not need to be raised by very much to more than cover such an amount.

It has been found that the influence of such treatments as early weaning has had a carry-over effect on the fattening period and, in particular, on carcass grading. In the Auchincruive study, some of the pigs reared under the two systems will be fattened in a specially constructed fattening house which allows facilities for individual feeding. In this way any large difference in liveweight gain, food conversion and/or carcass quality should be picked up in the fattening period.

Records

Apart from the usual production records such as liveweight gain and other data collected under Part I of the P.I.D.A. Pig Recording Scheme, an attempt is being made to record the environmental conditions. Temperature and humidity are being charted continuously, and regular spot determinations are being made of the ammonia and carbon dioxide concentrations. This information should allow results to be qualified to particular environmental conditions.

Acknowledgment is given to the Agricultural Research Council for their grant to cover the cost of the standard fattening house, to P.I.D.A. for the provision of a scholarship which has enabled Mr. Frank Cumming to undertake valuable observation and subsequent recording of atmospheric conditions, and to the South of Scotland Electricity Board for providing metering equipment.

Bulb Growing in the Hebrides

J. DAWSON and J. S. PANTON, M.A., B.SC.(AGR.)
North of Scotland College of Agriculture

No small interest is being aroused in the possibilities of daffodil bulbs as a useful cash crop for the Hebridean crofter. Experimental plots on Barra and South Uist are pioneering the way.

INTEREST in bulb growing in the Hebrides was first stimulated by the experimental work of the West of Scotland College of Agriculture under the direction of Dr. Nisbet, which showed that bulbs could be grown successfully on Tiree and the neighbouring islands. The interest and the practical possibilities of developing bulb growing as a commercial crop for the Hebridean crofter were further encouraged by the setting up of the Hebridean Bulb Growers, Limited, in 1957. The aims of this co-operative company are to grade, pack and market the bulbs for the crofters, and give technical assistance and advice.

Mr. J. W. Grant, Regional Director of the North of Scotland College of Agriculture, decided that experimental plots should be planted on Barra and South Uist. A careful survey was made in July 1957, and two centres at Eoligarry, on machair land on the south side of the Isle of Barra, and one on the machair land on South Uist, were selected.

Where and how the bulbs were planted

The machair land consists of shell sand with a light covering of peat or natural organic matter. The soil is light and easily blown during autumn and spring gales, and its successful cultivation and cropping demand a skill and knowledge acquired from years of experience. Bare land or fallows are avoided; a few rabbit burrows very quickly lead to wind erosion. An average soil analysis is: pH 7·7; phosphates—low to slightly low; potash—low to slightly low; organic matter 3–4 per cent.

In view of the high average rainfall of 60 inches, and other factors, such as the inexperience of the crofters in growing horticultural crops and lack of equipment and facilities, it was decided that only daffodils would be grown in these pilot experiments. The chosen crofters gave their full co-operation and interest throughout the experiments. They carried out the summer cultivations of cleaning the land and applying seaweed at 40–50 tons an acre, plus a low nitrogen compound fertilizer at 4 cwt per acre. The land was carefully prepared and ready for planting on 1st October 1957. Three varieties of daffodil bulb were bought, from Scottish-grown stocks—King Alfred, Corinthian and Aldhelm. Rounds and large splits were planted at all centres.

Mr. John MacLean and Mr. James MacDonald, Nos. 8 and 9 Eoligarry, Isle of Barra, each had one-sixteenth of an acre planted with 2½ cwt King Alfred, 1¼ cwt Aldhelm and 3¾ cwt Corinthian. Mr. R. Morrison, Lochside, Kilpheder, South Uist, planted one-eighth of an acre with 5 cwt King Alfred, 2½ cwt Aldhelm and 7½ cwt Corinthian.

As all planting and cultivation had to be done by hand, the bulbs were planted 4–5 inches apart in rows 14 inches apart. Planting by the spade and line method was suggested. The crofters considered this rather slow and arduous, and suggested using the Hebridean potato dibber. The dibber was given a fair trial, but after considerable discussion the spade and line method was finally adopted. When the planting was complete, each plot was fenced with ½-inch wire netting, a double strand around the outside and a single strand between varieties. The purpose of this fence was two-fold: to give protection from wind and blown sand, and also from straying sheep and cattle. In Barra the plots were about a quarter of a mile from the white, sandy beaches, and about half a mile from a rocky coastline on which the breaking waves were clearly audible and at times visible. As said, we had made a careful survey of the position and given due consideration to local experience and advice before deciding on the sites.

On completing the planting, we felt all was well, until Mr. MacDonald casually remarked, "the sea sometimes comes up here during the winter". So far it has not, and we hope this was one more example of the crofters' pleasing sense of humour. However, it emphasized the fact that one must know the islands and island conditions before starting on any scheme, either in agriculture or horticulture.

The harvest

With the mild, frost-free winters, the shoots appear above ground during December or early January, and the first flowers appear at the end of February. Since the main purpose of the experiment was bulb production,

the bulbs were de-blossomed as soon as inspected. This caused widespread consternation on the island, but the crofters faithfully carried out their instructions.

During spring, the plots were regularly hoed and kept clean, but as elsewhere, when the foliage is dying down, weeding and cleaning are impossible. However, the weed growth on this machair land has to be seen to be believed. Corn marigold, fat hen and *Potentilla* took possession for a few weeks until cleaning operations could be resumed. In the second year, the plots received a spring dressing of 4 cwt per acre high nitrogen compound fertilizer.

The bulbs were left down for two years, and lifted during the first week of July 1959. Experience has shown that daffodil bulbs make new roots very quickly in the moist sandy soils, and therefore early lifting is necessary to avoid damage to the base plate of the bulbs.

The results at each centre are summarized on p. 413.

On Barra, facilities and equipment for drying and storing the bulbs presented some difficulty. Thanks to the weather and ingenuity of the crofters, a well ripened and well graded sample of bulbs was finally produced. Every inch of shed room was commandeered. Spars from the shore, wire netting, sacking, tarpaulins and thatch were brought into use. At Kilpheder facilities were much better, and racks using wood and wire netting were quickly constructed in an airy shed to cope with what the crofter thought was a surprisingly rich harvest of bulbs.

In each case the weight of bulbs harvested was approximately twice the weight planted. Of this quantity, half was sold and half retained for planting.

Six more areas chosen

The fact that all three crofters were prepared to replant a similar or larger area of bulbs was very encouraging. Since the financial results were published, there have been numerous enquiries for further information and advice from various centres in the Hebrides and Western Highlands.

About twenty applications for a survey were received, and all of these have been investigated. As a result of this, six new areas of approximately one-sixteenth of an acre each were planted with daffodils during September and early October 1960. Four of these new centres are in Lewis, one in Harris and one in Skye. The main reason for discouraging the other prospective growers from investing capital in bulb-growing was that we felt their land was unsuitable. In one or two cases the suggested plots were on poorly drained, peaty soils; others were on shallow, stony land.

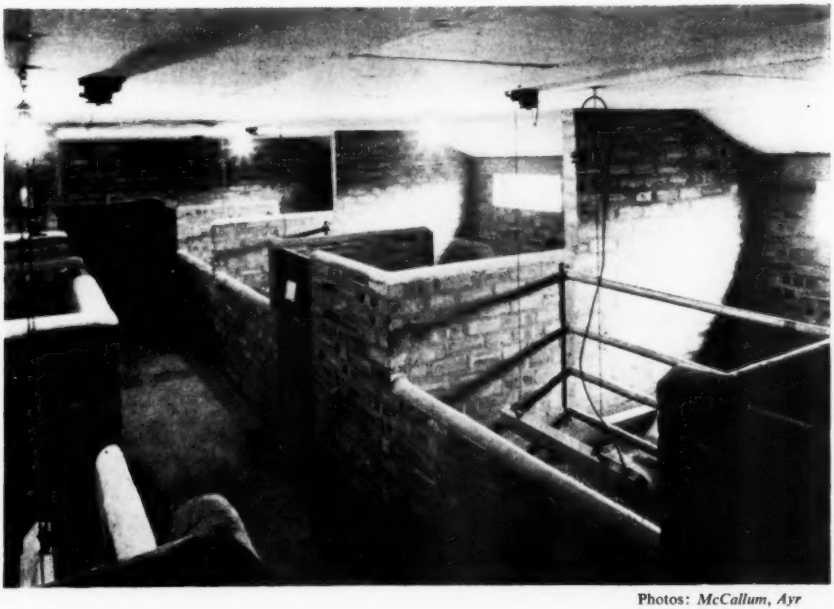
Selection of the varieties to be grown is important. First, the variety must give an economic increase of good quality bulbs under Hebridean conditions. Second, it must be a variety in demand for forcing, or one used extensively for spring bedding. To gain information on these points, a small-scale trial of newer varieties will be planted in the Hebrides this autumn, on one of the College demonstration crofts.

Experience has confirmed that daffodil bulbs can be a useful cash crop for the crofters in the Hebrides. Considerable expansion is possible, provided it is developed along sound technical and commercial lines. It must not be considered as a way of making money quickly and easily. Failure could indeed be costly to the crofter working on limited capital.

Daffodils planted in the machair land of Eoligarry, Isle of Barra, flowered freely and produced a promising harvest of bulbs. Six new areas have been planted this autumn.

Photos: *North of Scotland College of Agriculture*

In the new crate-type house (*above*) which is being compared with a standard farrowing house (*below*).



Photos: *McCallum, Ayr*

AGRICULTURE

AT YOUR SERVICE

A personal letter to all our readers

MINISTRY OF AGRICULTURE FISHERIES AND FOOD

Whitehall Place (West),

London, S.W.1.

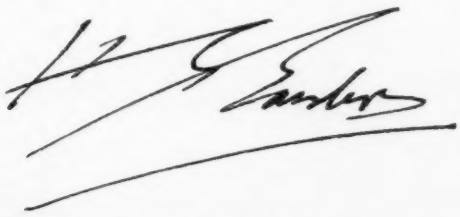
Dear Reader,

The Ministry's Journal "Agriculture" has now been at the service of farmers, growers and their advisers for 66 years. During this time, its pages have reflected the vast changes that have taken place in our agricultural and horticultural industries, and many of us have come to look to the Journal to keep us abreast of current thought and practice.

Like any other magazine, the editorial policy of "Agriculture" is reviewed periodically, and we would greatly appreciate it if you would help us with our current review by completing and returning the questionnaire opposite.

From your replies, we hope to ensure that future editions of the Journal will be of the greatest interest and value to you.

Yours sincerely,



Chief Scientific Adviser (Agriculture).

Agriculture

READERSHIP SURVEY QUESTIONNAIRE

1 Do the present contents of *Agriculture* meet your needs? Yes ☐ No ☐

2 If not, given that *Agriculture* must continue to cater for all branches of the farming industry, what change in emphasis would you like to see

- More scientific? ☐
- More practical? ☐
- More emphasis on the farm as a business? ☐

3 Are the main articles

- Too long? ☐
- Too short? ☐
- About right? ☐

4 Are you

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- A grower? ☐ Acreage ____
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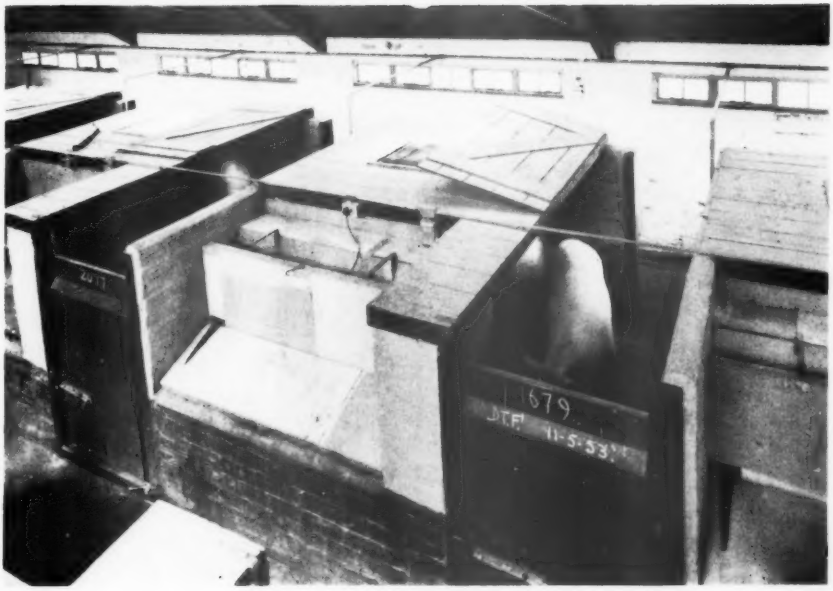
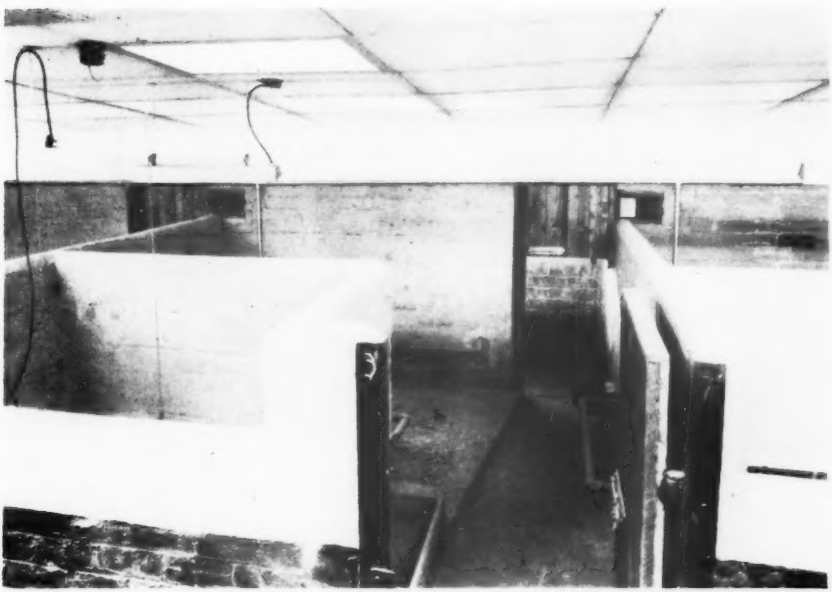
Auchincruive (Article on pp. 404–9)



The old farrowing house—now the rearing house—before and (*below*) after alteration.



Photos: *McCallum, Ayr*

Abbots Ripton Estate (Article on pp. 400–3)

A stack of this season's wheat straw, with Lord de Ramsey in the foreground.

Photos: *C. W. Rowell*

Two cottages which have been modernized and converted into one dwelling.

Centre 1: one-eighth of an acre at Lochside, Kilpheder, South Uist (Mr. R. Morrison)

Variety	Sold		Retained for replanting		Weight of dry bulbs harvested	
	cwt	*lb*	*cwt*	*lb*	*cwt*	*lb*
King Alfred	4	8	4	56	8	64
Aldhelm	3	44	2	56	5	100
Corinthian	8	111	7	0	15	111

COSTS	£	*s.*	*d.*	INCOME	£	*s.*	*d.*
Bulbs for planting (incl. carriage)	86	3	10	Proceeds from sale of bulbs	142	15	6
Fencing materials (less subsidy)	20	0	1	Less marketing and carriage	13	18	1
Fertilizers and chemicals	3	5	2				
TOTAL COSTS	109	9	1	TOTAL INCOME	128	17	5

Centre 2: one-sixteenth of an acre at No. 8 Eoligarry, Isle of Barra (Mr. John MacLean)

Variety	Sold		Retained for replanting		Weight of dry bulbs harvested	
	cwt	*lb*	*cwt*	*lb*	*cwt*	*lb*
King Alfred	2	0	2	56	4	56
Aldhelm	1	0	1	56	2	56
Corinthian	4	28	3	56	7	84

COSTS	£	*s.*	*d.*	INCOME	£	*s.*	*d.*
Bulbs for planting	42	11	4	Proceeds from sale of bulbs	57	17	2
Fencing materials (less subsidy), fertilizers and chemicals	14	16	3	Less marketing and carriage	6	12	1
TOTAL COSTS	57	7	7	TOTAL INCOME	51	5	1

Centre 3: one-sixteenth of an acre at No. 9 Eoligarry, Isle of Barra (Mr. James MacDonald)

Variety	Sold		Retained for replanting		Weight of dry bulbs harvested	
	cwt	*lb*	*cwt*	*lb*	*cwt*	*lb*
King Alfred	2	58	2	28	4	86
Aldhelm	1	78	1	56	3	22
Corinthian	5	80	4	56	10	24

COSTS	£	*s.*	*d.*	INCOME	£	*s.*	*d.*
Bulbs for planting	42	11	4	Proceeds from sale of bulbs	85	5	4
Fencing materials (less subsidy), fertilizers and chemicals	14	16	3	Less marketing and carriage	10	2	1
TOTAL COSTS	57	7	7	TOTAL INCOME	75	3	3

How to Market Flowers

BASIL UNITE

Geo. Monro Ltd., Covent Garden

Know your market, says Mr. Basil Unite, and build up a reputation with your wholesaler for consistently top quality blooms; he is the man who has to sell them.

I SUPPOSE it would be fair to say that as far as growing cut flowers and pot plants for market is concerned, there is only one axiom to remember and follow, and this is that only the best is good enough. Of course it is easy to say this but quite another thing to put it into practice. Nevertheless it is a fact that nowadays over a period a grower cannot make a living, much less a profit, unless he produces the goods; and a wholesaler, so often misnamed the middleman, cannot do so either by handling flowers and plants of only mediocre quality, since it costs him just the same to sell a box the contents of which realize £3 as it does to sell one realizing 15*s*. With such an undisputed truth as a basis for this article, I can go on from there having, as it were, laid down the keel before adding the ribs and the rest of the structure.

The best—and nothing but the best

The Market now—and I am talking about Covent Garden—is a very different place in 1960 from what it was before the war. With the expansion of provincial markets and more direct sendings to these markets, Covent Garden's business has diminished. That it is still the most important market there is no doubt, but because of the points mentioned above there is now a limit to what it can distribute—its area of distribution being narrowed as far as quantities are concerned. At some risk I would say that this Market, having lost some of its outlets for cheaper flowers to less discerning markets, now more than ever before must provide the really tip-top quality of everything for its more particular London customers. So again we come up against the need for the best—and the best presentation of that best. Really first-class flowers if presented and packed badly lose their initial appeal, and on bad markets especially this is fatal. Never lower the standard of packing because prices are low—that ha'porth of tar was never more worth while.

Whilst it is appreciated that every grower cannot grow everything of tip-top quality and must therefore sometimes have blooms of lower grade, it is essential that these grades should not be mixed in one pack. It is extremely short-sighted, to put it no stronger, to mix poor blooms with good ones in the hope of "getting away with it". This is by no means an unusual practice, and it is something which we never experience with flowers from the Continent. Given the quality therefore, grading is perhaps the next most important item on the list.

I suppose one should really link grading with packing and make certain of presenting the blooms in the best possible way. To begin with, select the most suitable container, especially if you're modern and reckon a non-

returnable is the box of the future. Don't sit down and keep your design a secret—come up here, see your wholesaler and get his opinion as well; he is the man who has to handle the packs and best knows the snags to be avoided from a market point of view. Similarly, sort out the right type and colour of lining paper. Surrealism may be understood by some, but *Lilium rubrum* (for instance) nestling in a bed of off-pink tissue looks just plain awful and in no way is its sale helped, however good the blooms may be, by such presentation. Generally speaking, all flowers should be packed in a semi-absorbent bluey-white paper—tissue should be avoided at all costs, and this goes for transparent paper lining too.

Note should also be taken as to how various varieties of flowers are bunched or packed. Sweet peas, for instance, should be presented as a fan—each bunch one colour. The reverse is true for anemones and polyanthus—in other words, as many colours as possible to a bunch and the bunch should be shaped like an old-fashioned bouquet. You should also know when chrysanthemums should be bunched or packed singly—when they merit 24 single blooms or 30 single blooms or more per box. Opinions *always* differ on this last point, as the number of blooms to a container should represent a grade. In actual fact it does nothing of the sort, since there are far too many growers who try to up-grade their flowers by under-packing. This sort of thing should be countered easily by the salesman who sells on the contents and *not* by what is written on the contents cards. Nevertheless this packing complicates and bedevils the issue, as so much stuff has to be "looked at" instead of being sold much more easily from sample.

Worth of a good reputation

It cannot be emphasized too strongly that growers should go all out to build up a good reputation—to reach the stage where we and our customers can always be certain of fair packing and general quality. In such cases flowers can be put on early orders or sent away to country customers without a qualm or fear of a come-back. It is the growers who produce this class of sending who will always make the grade—and deservedly too. Another point is that to attain this reputation a grower *must send regularly*. It must be remembered that shops sell daily and therefore need daily supplies. That other markets are making 2*d*. per bunch more, or the transport driver can only call twice a week to deliver flowers here, are two typical reasons why many consignments vary too much or don't arrive at all. In the former instance the grower should still send to the cheaper market in order to keep up the continuity of his supply to satisfy the continued demand for his produce. Naturally I am not suggesting that this sort of thing should be applied willy-nilly, as nobody would advise or expect a grower to accept the advice of continued sendings to a really depressed market showing a serious difference in quotations. But where differences are not so marked, then it is worth while taking a little less at the time. Over a period, and in any event by the end of the year, I should imagine, returns even out pretty well over the whole country on most varieties.

On the second point—inadequate transport—there is no excuse at all. Sack the hauliers and try and find another firm who *will* deliver as you want. Failing this, buy your own van and do the job properly. This is the best of

all as not only do your flowers arrive when they ought to, but you and your own men have their handling. Make sure too that the blooms you have carefully packed are well secured in the box—bearing in mind the "gentle" handling that most consignments receive en route! Always give us a box of flowers to sell—by this I mean a *full* box. Nothing looks worse than a half-empty box and besides that the contents do not travel half as well as one well filled. Flower boxes are bulky and customers have neither the room nor the desire to load up their vans with half-filled containers. Having done this, the last job is to make sure that whoever is going to receive this box can readily find out from whom it has come and what is inside it. Affix a clear label on one end—no, not on the side or on the lid!—bearing the sender's name and the count, grade and name of variety. Print it clearly—don't write it with a stub of blunt pencil. Some thousands of boxes arrive and are unloaded and sorted nightly. There is no time to try and decipher illegible writing or labels the writing on which has been obliterated by rain. Remember too that not only the unloading but most of the selling takes place under artificial light—so help your salesman to sell as easily as you can.

Growers should make a habit of visiting the market more often. Tip-top stuff in their own estimation may not be quite so tip-top when compared with other examples—the difference in the look of a box of flowers when it leaves the nursery, as against when it is on show here, is often unbelievable. And as many growers are unbelievers as far as the reports of their agents are concerned, it is far better for them to see the state of affairs for themselves. But not only that; by regular visits a personal friendship and understanding grows up between wholesaler and grower. Without such close contact and understanding, no two firms or men can ever make a real go of things. This business of ours is essentially personal. Get to know your wholesaler; if you don't like him, or vice versa, then call it a day.

Whilst on the subject of quality as such, may I say there is far too much rubbish allowed into this Market. This is, I think, primarily the fault of the wholesaler who, like some growers, is an unco-operative animal and unwilling to work in a team, even to insist upon and maintain a minimum standard. Insistence on such a standard could easily be made, but if the *idea* were to be set going by growers, there would be a beneficial and marked effect on prices—especially in bad times. A few growers already throw away flowers that they consider are not worthy of their good name or of Covent Garden. If the majority did the same I think the Market, those who send to it and those who work in it would be a great deal better off. I hate to think what percentage of flowers arriving here would be refused if judged by the standards applied by the Dutch authorities at any of their auctions!

Seasonal sendings

During the year there are various special occasions—Christmas, Mothering Sunday, Easter and so on. Growers naturally plan to provide for these in the various spheres of the particular varieties of flowers they grow. Unfortunately the weather usually does its best to upset these plans and it often happens, for example, that the chrysanthemums planned for Christmas week are ready by the first week in December. All too often I have experienced a shortage of these blooms during early December when, by reason of this shortage,

prices are unduly high but would be satisfactory if sendings had been heavier, then received vast quantities during the last ten days or so of flowers that are over-ripe; a disgrace to the trade and the worst possible publicity for British flower growers. To be a little greedy is understandable but too much so is suicidal. There is only one time to send a flower to any market and that is when it is ready—a few days before it is ready in many instances is even better. A grower should never see his blooms at even their near best on his own nursery.

Growers, like scientists, have caught the fashion of probing into and interfering with nature. In consequence many varieties of home-grown flowers now have much longer seasons—indeed for the most part they are available almost throughout the whole year. The gaps in supply and often in quality are remedied from further afield. I am not at all sure this is a good thing, and I do not mind being labelled as old-fashioned for thinking this way. In the past, new seasons were welcomed—spring daffodils—and then tulips. Irises would follow and so on—but now? Home-grown gladioli, for instance, finish in say October, so the public ought to have to do without them until the following May when the early forced ones should put in a welcome appearance. By this time they should herald a new season and be received with delight. But what actually happens is that the gap in the intervening months has been filled by sendings from South Africa, Malta, France and Palestine, and by the time really wonderful home-grown examples are available they are saleable at only mediocre levels. Can this be because buyers are tired of them? Can it be because the production of good all-the-year-round chrysanthemums, being excellent lasters and much lighter to handle, have stolen a march on them? Does it also follow that when indoor but normally grown chrysanthemums come along in quantity and of good quality that the expensive-to-grow American year-round varieties take a knock in their turn?

If I were a beginner

If I were an intending grower—a beginner—I think I should first of all come along and see my counterpart. The sort of thing I should be told would be that generally speaking most varieties of all flowers are over-produced. I should be asked whether I intended to grow under glass or not. If the latter I should be recommended to grow only those varieties that suit that region or that soil and to cut out any clever ideas I may have entertained of breaking away from the humdrum—ideas that have probably been tried and found wanting fifty years ago. If the former, however, I should be asked what I fancied growing—what I liked growing; for if one *likes* doing anything one usually does it far better than if the urge is not really there. Should that "thing" prove to be an up-and-coming line or a proven market line then so much the better. If it is not then I should have to think again. Having established what I was going to grow, it might then be pointed out to me that I was about to produce varieties of flowers that are already in abundant supply, but even so if I grew them, graded them, packed them and presented them a little better than the next man, I should have nothing to worry about, except of course the worry of doing all these things just that little bit better.

Mechanical Handling

CLIVE TETLAW, N.D.A., N.D.P.(HONS.)
National Agricultural Advisory Service, Derby

Mr. Tetlaw draws attention to some of the ingenious machines which may cut handling costs in and around farm buildings.

To reflect on the work involved in farming is to realize how much handling of materials is necessary, and also that the correct handling of these materials is one of the keys to increased profit. Seedbeds have to be prepared, fertilizers added, seed sown, weed-killers applied, crops harvested and presented to buyers. Animal feed has to be stored, ground and mixed to prepare a balanced feed, and fed to animals which have to be manhandled, slaughtered and processed. Every farm has a part to play in these production cycles, and there is no farm which does not have a handling problem. Our examples of mechanical handling devices will, therefore, point to basic principles which can be applied to reduce handling costs.

Ramps and loading bays for the reception and dispatch of goods should be a feature of all farms. These will avoid considerable manhandling and lifting, and enable trucks and trolleys to load and unload lorries. A mobile platform for loading and unloading lorries with different heights of tail board has recently been introduced. The loaded truck or lorry is wheeled on to the platform, which raises both load and operator to the floor level of the lorry, the operator unloads the truck, and returns it empty to ground level. The mobile platform also can be used for stacking goods in warehouses. Its maximum lift is 5 feet 3 inches, with a lifting speed of 6 inches a second; the platform dimensions are 6 feet 7 inches by 3 feet 3½ inches, and the cost is £510.

A more limited but similar application of this principle is already in use in poultry packing stations. Lorries fitted with a hydraulic tail board and with a capacity of 2,000 birds (eight galvanized steel crates of 250 birds each) can be loaded or unloaded in ten minutes by two men. The tail board costs £206, the crates about £62 each—and these can be supplied with alternative floors for carrying live turkeys, at an extra £7 10*s*. each. Wooden crates with the same bird capacity cost about £16.

Pallets and stillages

Materials should be put where they are to be kept until wanted for further processing. This means that adequate storage space is needed, and buildings and workshops should be planned accordingly. If repeat handling is to be avoided it is helpful to get advance notice of delivery from merchants so that arrangements can be made in sufficient time, and staff given adequate instructions. Where materials are placed on a floor they must usually be handled individually when they are moved again; by placing them on pallets or stillages one has, in effect, a transportable floor. There is a huge array of pallets and stillages with the required handling equipment on the market;

one brochure contains 22 different designs of wooden pallets, and others can be made to specification.

Sufficient pallets or stillages should be provided to avoid unloading, or the purpose will obviously be lost. A new development now available is simply a metal plate "board" which replaces the flat-topped pallet. The load-carrying plate has a push-pull action, using a gripping plate; advantages claimed are that the boards cost only a fraction as much as flat-topped pallets; that they are only about one-sixteenth of an inch thick, making an increase in stack stock possible almost without increasing stack height; they occupy less space, weigh only a few pounds, and so more pay-load per unit load can be transported. Pallets made of paper are also available. However, this system can only be operated with the specialized fork truck designed for it.

Conveyors

Hand- and foot-operated stillages and pallet lift trucks capable of weights ranging from 25 cwt to 2 tons, and costing from £30, are available. Here, too, a useful item is the platform and tug bar, handling loads up to approximately 20 cwt and costing about £20 complete. A locking device to hold it in the working position is available for an additional £4–£8; there are also fork lift trucks with a lifting capacity of up to 8 tons. A complete range of hand- and electrically-operated trucks is available for almost any job on smooth floors. Various conveyors are used, where the aim is to make the flow of work as continuous and direct as possible. They are generally for use within a limited space and several types are available; for example, roller, slat, screw ribbon, belt, wire mesh, portable belt and vibratory. An interesting use of a vibratory conveyor is single line feeding of small parts to various automatic machines, eliminating the cost of hand feeding—a pity that an egg is covered only by a shell! Illustrations of conveyors are given in the booklet issued jointly by the Mechanical Engineers Association and Aerial Ropeways Association, which contains approximately 130 diagrams and is printed in seven languages. Conveyors are not necessarily expensive: they start at about £2 a foot for 2-feet wide rollers. Fixed overhead conveyors are in use in poultry processing plants, working at speeds of up to 60 feet a minute. Portable ones are also in use, some as long as 35 feet: the boom is raised or lowered by hydraulic mechanism, and the four pneumatic-tyred wheels can be swivelled through 90 degrees to provide accurate positioning in relation to the loading or discharge points.

Another use for a conveyor is in cleaning out poultry houses. One for a laying battery house 18 feet wide and taking 2 stacks of cages will cost about £140; for every additional foot of house width an extra cost of 12*s.* should be allowed. This conveyor removes droppings from the ends of the stacks of cages into a cesspit or trailer; an elevator for use with it will cost £35. This unit will handle up to 6 runs of cages, with some 750 cages in each block, giving a total capacity of 13,500 birds. Roller conveyors are made of various materials to suit the different working conditions—in poultry packing stations nylon is often used—and special track couplers are available, so that the layout can be altered at a later stage.

White "food quality" non-toxic belting is available for handling food

products, and is used in poultry processing plants, with a 15-inches wide run of bench on either side of the belt. A 3:1 variable speed device can be obtained, giving a speed range for the conveyor belt of from 10 to 30 feet a minute.

Another use is in automatic blast freezing, where a metal slat chain conveyor moves through a long insulated chamber which forms a freezer tunnel. Freezing time can be varied from half an hour to eight hours, and the conveyor requires only a loader and an unloader to operate it.

Tubular tracks on a light overhead railway system can be fixed to timber or metal structures. A cross-track turntable switch enables the loads to be transferred between tracks at right angles to each other. These are used in poultry houses for feeding and egg collection.

Rearranging layouts to bring the work areas nearer together can shorten distances and make it unnecessary to move materials. To many people, transport means trailers, and they will be interested in the completely automatic trailer coupling. This eliminates the hand-coupling of trailers to a prime mover and can be fitted to any make of tractor. A simple mechanism consisting of a flared housing incorporating two spring loaded pawls is fitted to the rear of the tractor; the trailer drawbar is guided by the housing into the coupling and thrusts the pawls apart. When it is right home, the pawls snap together, locking it in position. The mechanism is enclosed in a heavy cover, and is robustly constructed to resist shock loading. It can be operated with the driver remaining in his cab; he can instantly release the trailer by operating a lever attached to a flexible cable.

Bulk handling

There is available an integrated system of standard commercial vehicles and specially designed containers for handling in bulk all kinds of factory waste and process materials. There are two types: one will lift, transport, set down or dump loads from 6,000 to 38,000 lb in containers ranging from 1 to 15 cu. yards in capacity; the other can pick up from ground level, transport and put down its own body, empty or loaded, without the driver leaving his cab. Body sizes range from 10 to 40 cu. yards, carrying a load rating of 20,000 lb. In contrast to these machines are the small trucks at £100–£150 which will push and pull loads of up to 15 cwt and turn on the spot. One of these weighs only about 1 cwt, and so is not only a transporter but can itself be transported.

A small item which would be useful in a hatchery for handling bins containing, say, incubator waste is a bogey which will make bins mobile and can be pushed easily on a level floor. This costs 57*s.* 6*d.* Another possible use for it, on farms where feed is home mixed, is to collect feed from the mixer into bins (thus eliminating bagging) and deliver them into intensive houses, where they can be moved on level floors to different feeding positions.

An interesting development for moving *people* is the self-propelled mobile working platform, which can be used to provide easy access to all overhead maintenance or installation jobs. The operator can propel the staging to a new working position without having to descend to the ground. As these cost as little as £30, such an idea will no doubt make the home decorator's heart miss a beat! Such platforms could have an application in future battery

units, which might be as high as five or six tiers, thus cutting housing costs per cage.

To aid mobility, at least two of the sack holders on the market can be fitted with castors for an additional cost of £1. These sack holders cost from about £1 15*s*. to £9 10*s*., the most expensive being used for multi-ply paper sacks.

The examples already given illustrate the role of mechanical handling in the production side of farming but here, in conclusion, is an example concerned with marketing agricultural products. A return flow bagging unit is available for prepacking potatoes into 5-lb bags with a weighing tolerance of -0 to $+1\frac{1}{2}$ oz at an average output of five bags per operator per minute. It is claimed that four operators have a total output of 2 tons 13 cwt an hour, which at a labour cost of 12*s*. per hour is 4*s*. 5½*d*. for labour per ton.

Milk, Management and Money

C. S. BARNARD

MILK producers have two main courses open to them when seeking to maintain or raise their profits. They can attempt to cut costs, in particular by relying on bulky fodders to produce the milk, or they can try to raise receipts—the most obvious way being to increase yield per cow by depending more heavily on concentrates.

As is shown in the Table below,* both these systems—named respectively "bulk feed" and "high yield"—make much the same profit per cow and per acre, although approaching the problem in very different ways.

	Bulk feed	High yield	Traditional system
	£	£	£
Receipts per cow	125	172	131
Costs per cow	85	133	114
Profit per cow	40	39	17
Profit per acre	13	13	6
Profit per gallon	11·7*d*.	8·4*d*.	5·0*d*.
Yield per cow	812 gal	1,104 gal	829 gal
Concentrates per gallon	2¼ lb	4 lb	4 lb
Yield per cow from fodder	458 gal	246 gal	226 gal

Bulk feeders obtain over half their production of 812 gallons per cow from bulky fodders, and feed concentrates at only 2¼ lb per gallon. This, combined with lower labour costs, gives a profit per gallon of nearly 1*s*. The high yielders, on the other hand, with a yield per cow of 1,104 gallons, feed concentrates for nearly every gallon and have higher labour costs, so that their profit per gallon is 3¼*d*. lower. However, their combination of a higher yield with a lower profit margin per gallon makes just as much profit per cow and per acre as the bulk feeders' more modest yield allied with a higher profit margin per gallon.

* Based on a survey of dairy herds in the Eastern Counties, made by the Farm Economics Branch of the School of Agriculture, Cambridge.

The Table also shows the results of "traditional" herds—these reflecting a system of management common in the Eastern Counties. Profit is less than half that made by the other two groups. The reason is not far to seek, for traditional herds fall between two stools—having the higher costs of the high yielders and the more modest yields of the bulk feeders. For instance, concentrates are fed just as heavily as in high yield herds, but yield per cow is nearly 300 gallons less.

In seeking a way out of this predicament, should the traditional herdsmen attempt to make their costs match their yields or their yields match their costs? In other words, should they put the emphasis on the high yield or the bulk feed approach?

Since both these systems show similar earning power, the answer must in part depend on the present circumstances and objectives of the individual herdsman. If his aim is to run a successful commercial herd without having to devote too much attention to it, he needs a plan that does not require an undue degree of specialization and can be put into action fairly quickly.

The bulk feed system would appear to fit these requirements. In the first place, the more important factors on which the success of the system depends —better utilization of bulky fodders and a more careful use of concentrates— can be put into hand reasonably quickly, whereas a considerable period may be required to build up to high yields. Secondly, since the lack of response of traditional cows to a high plane of feeding may be due in part to indifferent fodder, correcting this condition may lead to the double advantage of lower food costs and higher yields. In addition, the bulk feed system leaves a more stable profit from year to year as it is less affected by changing costs and prices.

Some National Veterinary Statistics

FROM October 1957 to September 1958 the Animal Health Division of the Ministry of Agriculture surveyed the extent of disease and wastage on a random sample of the dairy herds of the United Kingdom. This was the first time the collection of our national veterinary statistics had been attempted, and it represented the culmination of a series of pilot surveys of small areas in the previous five years.

A report on the analysis of the results from the 1,158 farms surveyed has now been published, and is available from H.M.S.O.* This report contains estimates of the national incidence of all diseases of dairy cows that were of appreciable national importance during the period of the survey, and of the extent to which the incidence of these diseases varied from one part of the country to another. It also provides an outline of many aspects of the husbandry of British dairy herds. One of the notable features of the picture is the considerable variation from one part of the country to another in every one of the fourteen aspects of dairy husbandry that were investigated.

The outstanding feature of the diseases of dairy cows was the importance of those associated with reproduction and lactation, particularly mastitis and the diseases closely associated with parturition. Of the remainder, the most important specific diseases appear to have been Johne's disease, grass tetany and foul-in-the-foot. There were marked differences between breeds, between different parts of the country, between different sizes of herd, and so on, in the incidence of several important diseases.

Most of the diseases analysed affected only a few herds seriously, the great majority of herds reporting little or none. This situation is characteristic of an infectious disease, but the metabolic diseases (milk fever, acetonaemia and grass tetany) and bloat were distributed between herds in precisely the same way. The authors conclude that the unknown factor or factors which tended to cause a high incidence of these diseases were therefore distributed over relatively few farms.

Information was obtained about the factors causing cows to be culled from the herds and the prices obtained for these cows. This information has been analysed to show some of the factors effecting seasonal changes in the size of the national herd, and also to estimate the extent to which certain diseases shortened the productive life and reduced the market value of diseased cows below that of healthy cows of the same age and breed. Acute mastitis and Johne's disease were the two disease conditions causing the greatest total loss through depreciation in market value. Poor milk yield caused a greater overall reduction of the productive life than did the total of all diseases.

The results of this survey are compared with the information published in 1932 by the Cattle Diseases Committee of the Economic Advisory Council (Cmd. 4591). The comparison suggests that in the last twenty-five years there has been a marked reduction in the economic losses associated with infertility and disease.

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* *Disease, Wastage and Husbandry in the British Dairy Herd 1957–58.* F. B. Leech, Muriel E. Davis, W. D. Macrae and F. W. Withers. Price 4*s.* (by post 4*s.* 4*d.*).

Farming Cameo: Series 2

31. East Kesteven

A. L. MARSH, B.Sc.
District Advisory Officer

THE district of East Kesteven has few natural boundaries. It extends in the west from the old Roman road, Ermine Street, to the county boundaries with Lindsey and Holland in the east, and as far north and south of Sleaford as makes slightly more than a quarter of the county. It is mainly an arable district, with potatoes, sugar beet, wheat and barley the most important crops. But the land varies greatly, and with it the systems of farming.

To the west of the district lies a ridge of Lincolnshire limestone, or heath as it is known locally. The soil varies in depth, but most of it will grow a useful crop of sugar beet, and favoured parts produce good crops of high quality potatoes. There is no set system of farming, but the land is generally farmed in large units, 500–1,000 acres or more, with Proctor barley the main crop. Most farmers retain some sheep, and kale is grown for folding off. The heath is useful free-working land which lends itself to large-scale mechanized farming, but it suffers in a dry season.

Eastwards lie the fens. Drainage is the main problem here. Every drop of drainage water has to be pumped into the outfalls, which are higher than the surrounding land. The difficulty in periods of high rainfall is to get the water away in the outfalls quickly enough. There is also the danger that the main outfalls may overflow or break their banks. Fortunately this risk is not so great in the district as elsewhere, but it did happen in one fen in 1958, flooding about 1,000 acres. These problems are being energetically pursued by the authorities concerned and improvements are in hand.

There are, broadly speaking, three classes of fen—silt, peat, and skirt. Unfortunately the area of silt is limited in the district. There is a small pocket in the east which is really a little bit of the Parts of Holland which has strayed over the county boundary. It is an area of high fertility, capable of growing a full range of market-garden crops.

Most of the fen in the district is skirt, ranging from a near peaty loam to some extremely heavy clay. The basic rotation is potatoes, wheat, sugar beet, wheat and one-year seeds. This is sometimes shortened by dropping the one-year seeds or lengthened by including another cereal and/or peas. The potatoes are all maincrop (Majestic and King Edwards), and the practice of indoor storage is increasing. On the really heavy fen sugar beet is often difficult to harvest, and may be replaced by the sugar beet seed crop. The fens and the skirt lands in particular are gradually reaching the turning point in their history. Their natural high fertility was built up slowly over a very long period, but now it has largely been cashed, and farmers are having to use more fertilizer to maintain yields. Fertility will have to be kept up as on the mineral soils. Many farmers are alive to this; for instance, there has recently been a spread of herbage seed growing on this land.

The remaining fen land is peat, ranging from a very fertile peaty loam to a really black fluffy peat which blows. The draining problem is intensified because, as the peat is used up, the land is sinking. Culverts dug by previous generations are now high and dry. Other major problems are potato root eelworm, weed control and acidity. Potato root eelworm is now well understood, but the effects of previous over-cropping are still being felt. Both forms of couch and redshank grow in profusion, and, until recently, could be controlled only by cultivations. All this land is naturally acid, with some stretches of it so acid that sugar beet growing is very difficult. Much of this land has been over-cropped with potatoes. Other problems on fen peat are blowing, late frosts and manganese deficiency. Most of our peats, however, are useful soils: the loamy types, given adequate drainage and freedom from potato root eelworm, are extremely fertile.

Between the limestone and the fens lies a very varied region of clays and gravels which together comprise about half the district. Except for the fen silt, most of the early potatoes in the district are grown on the light soils of the area. Favoured fields will lift 3 tons per acre in the first week in June, but the main dig is 10–14 days later. On the earliest fields where eelworm is not a problem, potatoes are grown continuously, but they are generally brought into rotation with sugar beet, wheat and barley.

On the heavier soils, where most of the grass in the district is concentrated, potatoes and sugar beet become increasingly less important as the soil gets heavier. Winter wheat is the most important crop, but recent developments in varieties and manuring have enabled spring corn to be grown more extensively. In the series of wet years much land became full of the grass weeds and in poor physical condition. The dry summer of 1959 helped considerably to correct this, and the recently introduced sprays for the control of weed grasses have been useful. Local farmers are keeping a sharp eye on the development of sprays to control wild oats, which are now the chief weed problem. However good the drainage and cultivations, most of this land needs its rest under grass. Some farmers have turned to herbage seed growing, mostly cocksfoot and timothy, with useful results. Dairying is carried out, in the main on the smaller units, but is less important than beef or store cattle. The beef farming is diverse, but the larger farmers tend towards buying in stores for fattening, or to a single-suckling herd, and the smaller men favour calf-rearing or growing on stores for selling again as stores. Sheep numbers have been rising steadily and the ewe flock has now quite an important place. The heavier type of cross-bred ewe is favoured, going mostly to a Suffolk tup.

In conclusion, special mention must be made of Lincoln Red Shorthorn cattle, as the district has well-founded claims for being the centre of the breed. Originally selected for treading straw and living cheaply over a period of three to four years, most steers are now off fat at around two years old, and autumn-born calves are capable of finishing out of yards the following winter. Much of the credit for this is due to the breeders, many of whom live and farm in East Kesteven.

Pigs for Modern Markets

THE market needs of the modern housewife call for a change of emphasis in pig production, Lord Trenchard told the Farmers' Club on 12th October. The market today is much more standardized than before the war. Extremes of poverty and luxury have disappeared, and most people want good food at reasonable prices. Self-service is growing, and with three million wives in full-time employment and very little domestic help available, convenience is at a premium.

The traditional approach, whereby the pig was "tailored" on the farm for a specific market, and retail shop-keepers broke down the bulk carcasses for a wide range of markets, is no longer efficient. This combination of marketing methods will prove expensive today, said Lord Trenchard. Tailoring both on the farm and in the shop is likely to be replaced progressively by tailoring in the factory. "It is a fair conclusion," he added, "that at least two of the three main outlets for pigs can be combined economically to a far greater extent than is done today, and that changes towards the use of a pig for at least two and perhaps three markets will be developed." We may expect many more curers-cum-manufacturers, or fresh meat producers-cum-manufacturers, to emerge, or even single units combining all three activities.

Among reasons why these trends have not gone further so far, Lord Trenchard mentioned the high capital requirements of modern cutting and prepacking; the locations of many of our present factories, which were sited for dealing only with whole carcasses subsequently distributed in bulk; the reluctance of retailers to accept the smaller margins usually prevailing for prepacked goods; and sheer conservatism. Under this heading he included the sloping of the government subsidy towards the main trade of the present rather than the future, and a "peculiar brand of conservatism that has induced a slavish copying of the pre-war successful Dane".

Today, the basic requirement in the pig itself is the greatest amount of economically produced lean meat. When cutting and packing are practised in the factory, ingenuity will solve the problems of cut sizes and the utilization of heavy shoulders. Lord Trenchard emphasized the danger in striving to increase the profitable cuts in the pig genetically. For when one standard market is to be supplied, if by increasing the proportions of back and ham the quality of the streak or shoulder is worsened, these will probably become unsaleable at any price, thereby more than offsetting the advantage from bigger proportions of back. "Furthermore," he added, "we have yet to see good ham consistently produced on pigs which do not have reasonably large shoulders."

Lord Trenchard then discussed farming aspects of pig production aimed at meeting modern market needs. Factors that influence the cost of good quality lean meat include breed or type, a subject on which research is only in its earliest stages; the question of ideal weight for slaughter; and husbandry methods, in particular restricted against *ad lib.* feeding.

Figures from experiments at the Unilever Research Centre at Colworth House, using pigs between 140 and 260 lb live weight, demonstrate that

provided very small values are placed on the extra fat produced, lean meat is secured more economically from the heavier pigs. Supporting these findings, Lord Trenchard quoted figures obtained at Thanestead, the Unilever farm near High Wycombe, which demonstrated the economic advantage of producing heavy pigs. The net cost of producing 1 million pounds of lean meat was £258,160 from 13,423 heavy pigs, compared with £261,510 from 15,504 baconers. These weaners cost £3 18*s.* 6*d.* each. Had they cost £5, the national average according to 1958 Cambridge University costings, the results would have favoured the heavy pig even more. The overall conversion rate of 3·45 for the best bacon pigs produced at Colworth House compared favourably with the figures generally achieved for Wiltshire bacon pigs. If in future a conversion rate of 3 becomes practicable on a large scale commercially, then to produce 1 pound of lean meat from heavy pigs at a comparable price, and without allowing a value for the extra fat, a conversion rate of 3·58 would be necessary. Lord Trenchard considered that this figure is not outside striking distance, since if the poor doers had been culled, the unselected Thanestead cross-bred heavy pigs would already have attained 3·85.

In producing the liberally fed heavy pig for factory handling, cheap by-products such as bakery waste, whey and potatoes can be utilized. A good protein ration up to 140 lb live weight, followed by a finishing ration of liberally fed grain, produces a carcass of high lean content with good texture and flavour which, when trimmed, commands consumer premiums for quality.

Lord Trenchard considered that the economics of heavy pig production are not negatived by the extra fat, since manufacturers need it for sausages, pies and for improving beef products and therefore value it at more than 1*s.* a pound. And even at 7*d.* a pound for lard it is still profitable.

In breeding pigs for high quality lean meat, important factors are the cost of a weaner and the cost of growing and conversion. "The quantity of lean meat found in British pigs as a whole is disappointing," he said. "I feel that there is the need to import a pig of the same muscular stocky type as the Pietrain."

Concentration on heavy pig production for factory tailoring would eliminate current practices such as immature slaughtering, feeding costly high protein diets, and the use of restricted feeding methods, all of which add to production costs in a system tied to farm and shop tailoring. Much work remains to be done. But, Lord Trenchard concluded, if we look forward to the changes that are taking place in the consumer market, rather than backward to the way in which we have traditionally consumed pig products, then we shall be able to develop the means of maintaining and, indeed, increasing the competitive efficiency of our home industry.

SYLVIA LAVERTON

CORRECTION

The Egg Situation: Some Observations (October issue). The fourth line of the table on p. 371 should read:

	Large	*Standard*	*Medium*	*Small and seconds*	*Total*
Total value	25*s.* 4*d.*	21*s.* 8*d.*	4*s.* 2*d.*	3*s.* 1*d.*	54*s.* 3*d.*

THE MINISTRY'S PUBLICATIONS

Since the list published in the October 1960 number of AGRICULTURE (p.362) the following publications have been issued.

MAJOR PUBLICATIONS

Copies are obtainable from Government Bookshops or through any bookseller at the price quoted.

BULLETINS

No. 173. Bulk Storage of Potatoes in Buildings (*New*) 3*s.* 6*d.* (by post 3*s.* 10*d.*)
Discusses the siting, design and construction of buildings for the storage of potatoes in bulk. Deals also with insulation and ventilation, and the questions of mechanical handling and managing the crop from the time it is put into store until it is marketed.

No. 115. Construction and Heating of Commercial Glasshouses (*Revised*) 6*s.* (by post 6*s.* 6*d.*)
This new edition has been almost entirely rewritten to include changes in glasshouse design and improvements in heating and firing equipment which have resulted from recent research. All aspects of the subject are covered, from choice of site and nursery layout to estimation of fuel consumption.

OTHER PUBLICATIONS

Milk Composition in the United Kingdom. Report of an Interdepartmental Committee. Cmnd. 1147 (*New*) 5*s.* (by post 5*s.* 5*d.*)

Disease, Wastage and Husbandry in the British Dairy Herd 1957–58 (*New*) 4*s.* (by post 4*s.* 4*d.*)

LEAFLETS

Up to six single copies of Advisory Leaflets may be obtained free on application to the Ministry (Publications), Ruskin Avenue, Kew, Surrey. Copies beyond this limit must be purchased from Government Bookshops, price 3d. each (by post 5d.).

ADVISORY LEAFLETS

No. 15. Husk or Hoose in Calves (*Revised*)

No. 233. Beet Eelworm (*Revised*)

No. 435. Making the most of Farmyard Manure (*Revised*)

No. 444. Magnesian Lime and Magnesian Limestone (*Revised*)

No. 468. The Modified Commercial Hive (*Revised*)

No. 480. Cannibalism and Feather Picking in Poultry (*New*)

FIXED EQUIPMENT OF THE FARM LEAFLET

No. 39. Farm Buildings: Roof Coverings (*New*) 1*s.* (by post 1*s.* 2*d.*)

FREE ISSUES

Obtainable only from the Ministry (Publications), Ruskin Avenue, Kew, Surrey.

UNNUMBERED LEAFLETS

Inspection and Certification of Fruit Plants (*New*)
Full-time Agricultural Education in England and Wales (*Revised*)

In Brief

POULTRY POST-MORTEMS BY MINISTRY VETERINARY LABORATORIES

From 1st December 1960, the fees payable for post-mortem examinations of poultry at the Ministry's Veterinary Laboratories will be raised from 3s. to 12s. 6d. per report on adult birds and growers over four weeks of age, and from 5s. to 17s. 6d. per report on batches of chicks up to four weeks of age. The free service to members of the Poultry Stock Improvement Plan will be continued.

The present scale of fees has remained unchanged since the service was introduced in 1925. In the meantime, costs have risen very greatly. In order that the service should be fully self-supporting, further substantial increases will be made in December 1961. Thereafter, the charges will be regularly reviewed to keep them in line with costs.

The poultry industry and the professional bodies concerned have been consulted about the proposed changes. Their suggestion that full fees should be introduced in two stages has been adopted.

ERADICATION OF BOVINE TUBERCULOSIS

On 1st October the whole of Great Britain became an attested area. This date marks the successful completion of the official scheme to eradicate bovine tuberculosis as a disease on a nation-wide scale in the short time of ten years. Scotland and Wales reached their objective a year ago: since then the remaining parts of England have been brought up to the necessary standards.

A few pockets of infection are bound to remain, so tuberculin testing will go on for some considerable time. One of the effects of an Order made on 1st October by the Minister of Agriculture, Fisheries and Food is that from that date permits or licences to move attested cattle between farm premises or to or from markets anywhere in Great Britain will not normally be required.

Compensation payable for an animal slaughtered compulsorily because it reacts to the tuberculin test will continue to be at the rate of 75 per cent of its full market value had it been an attested animal. Compensation has, in the past, been subject to a maximum of £100, but from 1st October, a new maximum of £120 will be introduced, which takes into account the changing value of cattle. From the same date, the compensation payable for an animal slaughtered compulsorily, not because it has reacted to the tuberculin test but because it has been in contact with a reactor, will be its full market value as an attested animal.

WORLD CENSUS OF AGRICULTURE

The Food and Agriculture Organisation of the United Nations has asked all countries to take an Agricultural Census in 1960–61. After consultation with the Agricultural Statistics Advisory Committee, the Ministry of Agriculture, Fisheries and Food is co-operating with the FAO in this internationally-planned operation, as it did on the occasion of the last World Census ten years ago.

In many countries the present census will involve a considerable number of questions for each farm. But in England and Wales most of the information needed is already provided by the usual Agricultural Returns; to meet the FAO's requirements it will only be necessary to supplement the normal censuses by asking additional questions on a special form.

The great majority of farmers (some 324,000) will be asked to complete a 26-item form which will be sent to them in January 1961. A representative

sample of some 18,000 will, however, be asked to complete a more detailed form to be collected from them between mid-October and mid-January by the Ministry's field officers, who will assist in the completion of the forms. The answers to the questions in this longer form will be raised statistically to fill out the picture presented by the answers to the shorter form.

Both sets of questions relate to the area of the holding, ownership, management, water supply and irrigation. Occupiers are also being asked to give the name and address of the owner (or owners) of the holding and the acreage owned by each. This will enable a list of owners, previously lacking, to be compiled, and facilitate analysis of the structure of the industry on the basis of ownership as well as of occupancy.

The census is voluntary, but it is hoped that all farmers will co-operate with the Ministry by completing and returning the forms sent to them.

IMPROVING GLASSHOUSE HEATING SYSTEMS

Although many nursery heating systems have been modernized during recent years, large numbers of ineffective and wasteful systems still exist. In these cases, improvements in the method of production of heat, and in its control and distribution, would not only use fuel and labour more efficiently but would also produce better growing conditions.

A better boiler is sometimes necessary but, if the boiler is of the correct size, the replacement of hand firing by automatic firing enables fuels to be burnt more completely, and in many cases also a cheaper fuel can be used. This means a considerable reduction in the cost of useful heat. In addition, with the automatic temperature control associated with automatic firing, heat is supplied only when required; this gives better growing conditions while at the same time reducing the labour involved. Where many small boilers are at present serving individual heating systems on a holding, it is generally better to group the systems together and install one or two large boilers, rather than attempt automatic firing for each small unit. Distribution of hot water to houses some distance from the boiler is not a problem with pumped circulation, which will be installed at the same time as the firing equipment.

Where the temperature distribution in glasshouses is uneven, growing conditions are consequently poor. They can often be improved by a rearrangement of the heating pipes in conjunction with pumped circulation. If improvements are needed in both heat production and pipe layout in the glasshouses the work can be done in two stages, if this is more convenient than to do the whole job at once.

Such are a few of the means by which glasshouse heating systems may be improved. The commercial nurseryman now has the opportunity, under the Horticulture Improvement Scheme, to obtain a Government grant of one-third of the cost of carrying out this work. A considerable number of growers will undoubtedly take advantage of the opportunity, and they will probably want to do so quickly, in order to have their heating improvements finished in time for next season.

If you are one of these growers, this article offers you advice: start planning now. Hasty plans are bad ones, and some improvements to heating systems carried out in recent years are not as good as they could have been, because insufficient time was allowed between the decision to do the job and the date by which it had to be completed. Remember that weeks and sometimes months may go by while a plan for the new heating system is being prepared and prices are being obtained for the job. After that, there may be a further delay before the selected firm is able to start work—and that delay may be longer in the future, because of the increased work the Horticulture Improvement Scheme is

likely to put on firms with a knowledge of glasshouse heating. Thus, unless early arrangements are made, it may be difficult to get the job done when required.

Remember also that any proposal for which you wish to receive grant will have to be considered and approved by the Ministry of Agriculture, *and you cannot start work until that approval has been obtained. Without it no grant will be paid.* Naturally, the Ministry need time to consider your proposal; it is their job to make quite sure that the taxpayer's share of the cost will be money well spent. And, of course, their qualified staff will have many other proposals to consider at the same time, all submitted by growers as anxious to begin work as you are yourself. So as soon as you have decided what needs to be done, and have obtained tenders, apply for grant; your local Divisional Office of the Ministry, or your N.A.A.S. Horticultural Advisory Officer, will give you details of the Scheme.

G. P. Shipway

PIG FEEDING FOR GROWTH AND GRADING

Whether the aim is for pork, bacon or heavy pig production, much depends on food conversion efficiency and speed of growth, says Mr. H. L. H. Wheeler, Vice-Principal of the Norfolk School of Agriculture, in a recent issue of *Pig Farming*. Food conversion efficiency and speed of growth, he says, can work in opposition. *Ad lib.* feeding obviously helps the latter, but usually not the former. Free feeding of pigs under progeny testing will, it is hoped, find the strains which can be handled in this way but, as yet, for many pig-keepers a more controlled system of feeding is necessary to produce pigs that will grade well.

Under these conditions, and as well as grading figures, the cost per lb liveweight gain is perhaps the best yardstick of efficiency. This also takes into account the quality of meal, and it can often be shown that price per ton is by no means the only consideration.

In short, it should be possible to produce financial conversion rate figures for bacon production of the order of 10d.–11d. per 1 lb liveweight gain. With food costing £28 per ton, this means an actual conversion rate of 3·4. If food costs rise, there must be an improvement in food conversion to achieve a similar target figure.

Mr. Wheeler reports that at the Norfolk School of Agriculture careful recording has allowed these points to be studied and changes have been made in rations from time to time in the light of experience gained. The main commercial feeding practice has been *ad lib.* feeding of the Large White pigs from weaning at eight weeks of age up to 100 lb live weight, reached at about 16 weeks of age. After that controlled feeding to a maximum of 5 lb of meal per day has maintained growth rate at around 10 lb liveweight gain per week.

Water has been restricted by leaving water bowls on for only six to eight hours per day. This has helped food conversion on *ad lib.* feeding, but it introduced the practical problem that the bowls had to be very securely fixed to the walls to withstand heavy demands when water is turned on.

ROYAL SHOW SITE

The Royal Agricultural Society of England is to lease from Lord Leigh a 460 acre site for a permanent site for the Royal Show at Stoneleigh Abbey, near Kenilworth, Warwickshire. The lease will cover an initial period of seven years, with an option for a long lease if both the site and the arrangement prove acceptable. The negotiations are subject to planning permission being obtained from the relevant local authorities, and also subject to contract.

Few traces of the medieval monastery can be seen today, and nothing remains

of the Abbey church. The present house, built in the Italian style by Francis Smith of Warwick for the third Lord Leigh between 1714 and 1726, is built on four sides of an open space which roughly coincides with the old cloister garth.

A BREAK WITH TRADITION

A new film made by I.C.I., entitled *A Break with Tradition*, tells the story of how Mr. Peter Carr, farming near Chester, has broken away from traditional Cheshire dairy farming methods. Old buildings have been modified, and his grassland management intensified to the point of keeping 110 cows on 153 acres with a very low level of concentrate feed.

Since the two most important items in the cost of milk production are feed (about 60 per cent) and labour (about 20 per cent), the dairy farmer needs to make the maximum use of grass throughout the year—grazing in the summer, silage in the winter.

A policy of intensive grass production, coupled with self-feed silage, loose housing and parlour milking, meets both these requirements.

Mr. Carr is one of the pioneers of this system. Over 900 tons of silage are now made, and the total labour force for the dairy herd is just Mr. Carr and two men.

Copies of the film, which is in 16 mm Kodachrome and runs for 30 minutes, can be obtained from the Film Library, Imperial Chemical Industries Ltd., Imperial Chemical House, Millbank, London S.W.1.

CHICK REARING

Until the last few years it was normal policy to buy day-old pullets in the spring —heavy breeds from mid-February to mid-March, first crosses from mid-March to mid-April, and light breeds from 1st April to 1st May.

In recent years the increase in the numbers of chicks produced by complex breeding methods and the speedy development of the intensive system has made it difficult to give simple advice on the most suitable times to buy chicks. The spring periods suggested above generally make the task of rearing easiest. But the change to intensive systems—particularly the popularity of deep litter—has led to a period in July and August when egg prices tend to rise. This in turn has resulted in the popularity of the autumn hatched chick, which, *under good management*, is in full lay in the early summer and so helps to even out egg production over the year.

For the skilled stockman, some chicks hatched before Christmas and a similar number of spring hatched chicks can give a more even egg production and a more economic employment of his rearing equipment.

FARMERS CLUB ANNUAL DINNER

The speakers at the Annual Dinner of the Farmers Club, which is to be held at Grosvenor House on Tuesday 6th December, will be:

Viscount Amory of Tiverton (principal guest);
Rt. Hon. Christopher Soames, Minister of Agriculture; and
Lord Brecon of Llanfeigan, Minister of State for Welsh Affairs.

Mr. Elwyn Jones, chairman of the Club will preside.

SHELL FILMS

Shell's new film catalogue, just out, lists sixteen films on agricultural subjects, and many others which will interest and concern farmers. Soil erosion and its prevention, Charollais cattle, and the rearing of day-old turkeys are among matters touched upon.

The catalogue can be obtained and the films borrowed from Shell-Mex and B.P. Ltd., Public Relations Department/Films, Shell-Mex House, London W.C.2.

Book Reviews

Milk Composition in the United Kingdom: The Report of an Interdepartmental Committee. H.M.S.O. 5*s*.

The Interdepartmental Committee appointed "to consider the composition of milk sold off farms in the United Kingdom from the standpoint both of human nutrition and of animal husbandry and to recommend any legislative or other changes that may be desirable" has produced a report which will be studied with lively interest by all sections of the dairy industry.

It summarizes the historical background to the introduction of legal standards for milk, and reviews the main changes in the pattern of milk production and distribution which have occurred since most of the present law on milk composition was introduced some sixty years ago.

The many and complex factors influencing the composition of milk, the importance of milk in human nutrition and the national trends in milk composition are discussed in some detail.

The Committee concludes that in England and Wales there has been a slight decline in both the fat and S.N.F. contents of milk during the last thirty years, but that there has been little change in Scotland. Fear is expressed that the gradual decline in S.N.F. may continue unless steps are taken to arrest it. From the standpoint of human nutrition this fraction of milk should be maintained at existing levels, and if possible increased. The Committee urges that this should be the main objective of the dairying industry in the years ahead, and that both statutory and marketing means be used to achieve it.

For statutory purposes it is recommended that the existing presumptive standards for fat and S.N.F. should continue for the present, and eventually be replaced by fixed minimum standards of 3 per cent fat and 8·5 per cent S.N.F., which would apply to milk, other than special grades, only at the point of sale to the consumer.

The recommendations on marketing arrangements include a system of differential payment schemes for S.N.F., to be operated by the Milk Marketing Boards.

In addition to this two-pronged approach to the problem that progeny testing of A.I. dairy bulls should include records for S.N.F., and that these should be considered when selecting bulls for artificial insemination purposes, further licences for bulls of the dairy breeds should be refused in the absence of adequate performance records and a new category of "premier grade licence" should be introduced to include a minimum S.N.F. performance qualification varying with the breed.

The Committee points the way to achieving an improvement in the composition of milk, but it will be for the industry and government departments concerned to agree upon the implementation of the proposals.

The report, which is full of meat, calls for close study by all who are concerned with the welfare of the milk industry.

What a pity that it is issued in a paper cover!

G.T.M.

Principles and Methods of Animal Breeding. (3rd Edition). R. B. KELLY. Angus and Robertson. 42*s*.

The third edition of Dr. Kelley's book does more than bring up to date the valuable material presented in earlier editions. It also gives a clearly expressed and well proportioned presentation of the modern approach to breeding and genetics, taking a refreshing world wide view of animal breeding and the problems experienced in many regions of the world.

To support the principles which he has presented, Dr. Kelley has drawn on research work with *Drosophila*, mice, poultry, working dogs and large farm animals. He has also cited evidence from practical breeding projects with farm animals in Australia, America, Russia, Britain, Denmark and many other countries.

As in earlier editions, the author has traced the history and development of Shorthorn, Aberdeen-Angus and Hereford cattle and the horse to demonstrate the principles underlying the achievements of the early livestock improvers. He has also

included a valuable chapter on parallels in plant and animal breeding.

The chapter on artificial insemination appears as it stood in previous editions. Dr. Kelley has discussed the impact of A.I. on livestock production in certain countries in a chapter which forms the first of three parts on modern animal breeding.

Mendelism and the mechanism of inheritance are clearly described, and simple population genetics and biometry are introduced through the discussion of the inheritance of multifactorial characters. The arithmetical calculations referred to throughout the treatment of population genetics are presented in an appendix.

Also in appendix form is the concise method of calculating Wright's coefficient of inbreeding and relationship, together with a comprehensive list of references and a glossary of terms.

Dr. Kelley points out that despite the modern aspects of breeding he has described, "concepts of population genetics have not given rise to any new methods of animal breeding, nor caused any of those in use for hundreds of years to be discarded"; but they are valuable in explaining past breeding procedures, so as to obtain maximum future benefit.

This concise and readable book will doubtless continue to be a valuable text for students and breeders alike for some time to come.

D.C.D.

The Agricultural Register: Changes in the Economic Pattern 1957–59. (New Series 1960). H. FRANKEL. Oxford University Press. 25*s*.

The Agricultural Economics Research Institute, Oxford, has added two volumes since the war to its series of chronicles of developments in agriculture and agricultural policy. The first, published in 1958, dealt with the period 1956–57; this year's volume reaches into 1959. There is in future to be an issue every two years.

Two-thirds of the space is devoted to a commodity-by-commodity account of changes in the guarantee system, the supply and price situation and, wherever possible, facts about the distributive end of marketing. An equally conscientious review of land, labour and capital accounts for half the remainder, while other stones turned are consumption, prices, etc., of fertilizers and feedingstuffs.

There is an interesting analysis of the aggregate statistics bearing upon the place of agriculture in the economy. This, however, is not entirely without blemish; the assertion that the entire increase in food consumption between 1950 and 1958 has been supplied from abroad is at variance with both the figures given in support and the unquestioned increase in home food production during the period.

The sources upon which the authors draw are legion. The Annual Review White Papers, the reports of Committees of Enquiry, etc., and statements and publications of marketing boards head the list; the reports of the Committee of Public Accounts are also well combed. No published work of relevance escapes the net.

The Institute succeeds in setting out the indisputable facts underlying the usually controversial issues of agricultural policy without fuss. These volumes will always earn the gratitude of the many people to whom reliable reference books provide the only hope of order in an increasingly untidy world.

J.A.E.

Crop Production and Environment (New Edition.) R. O. WHYTE. Faber and Faber. 63*s*.

Dr. Whyte's revision of the first edition of *Crop Production and Environment* deals almost exclusively with researches since 1946. The book is, as the author states, a review with the needs of the agricultural botanist, agronomist, crop ecologist, plant breeder and general biologist in mind. It also emphasizes some of the important facts arising from research on growth and reproductive development in relation to agricultural and horticultural practice.

This is an ambitious task, as is acknowledged by the author, who devotes two-thirds of the book to "the greater understanding now being gained of the distribution, growth and reproduction, genetical composition and yielding capacity of crop plants throughout the world", the rest dealing with basic research. The theme of the book is presumably stated by Dr. Whyte in his introduction when he refers to the importance of autecology in the study of crop physiology, growth and reproduction, and then elaborates "on the central problem of plant science", which is a better understanding of the effect of the environment on all manifestations of

plant growth, and therefore on the yield of crops.

After stating the problem in the first chapter, which also summarizes the effects of temperature and light on plant development, the author devotes the next seven chapters to biological organization, competition for light, the biochemistry of reproduction, synthetic regulatory substances, gibberellin, chemical retardation of growth and flowering, and development before seed dormancy. Then follows a chapter on equipment and one on gene ecology and breeding before the individual crops, "classified in relation to the degree of manifestation of vegetative growth, reproductive development, or a combination of the two", are considered. This is a convenient grouping, bringing together herbage and fodder plants, roots and tubers, bulbs and corms, cereals, etc.

The book is a most valuable and interesting compilation which, in spite of its necessarily cursory treatment of individual subjects and crops, reflects particular and general trends in work and thinking on experimental physiology relating to environment and crop growth. Dr. Whyte has had to do a great deal of sifting of material, and the presentation is both clear and concise. There is a good bibliography of over 600 items, the photographs are excellent and the diagrams clear and most helpful.

G.D.H.B.

The Horse in the Furrow. G. E. EVANS. Faber and Faber. 25*s.*

If you have an interest in the countryside, its history of customs, traditions and folk lore, you will enjoy reading *The Horse in the Furrow*. Farm production in our day is related to mechanical power, and in this book George Evans has pursued the story of the age of horse power—an era which has only recently passed. This is a record of the life of the old "hossmen", of the Suffolk Punch, the horse of "the seven shades of chestnut".

The book is a useful contribution to agricultural history, for here we have factual records taken from the men who wore sleeved weskits, proudly bore the title of Lord of the Harvest, and were privileged employees of the farm. Journey and glove money are explained; ploughing five earths, overwart and summerland, the thiller gear and hames are described: for all these strange things, you will have to read to discover their significance.

Dried tansy leaves, powdered and kept in a linen bag, infusions of agrimony and the collection of burdock and celandine are some of the old remedies recorded for horse ailments. The strange goings on at the Society of Horsemen, the breathing into the nostrils and the ritual of the frog's boon have all been faithfully collected from old horsemen and are now safely recorded.

George Evans draws freely on other authors, and this enhances his own work. In the history of the Suffolk horse, he recalls the colourful records of Herman Biddell and his endless enquiries, which finally led to the founding of the Suffolk Stud Book. The Suffolk family names of Sherwood, Pratt and others are happily mentioned among those who remain faithful to the interests of the Suffolk horse.

The author considers that the day of the farm horse passed about a decade ago, and that with it has gone a proud race of men who lived hard. The harness-makers disappear or turn to other goods, and the progressive blacksmith has become an engineer: the baiting houses are now sellers of beer and their stables are empty.

This is good country reading and a book which can be recommended to a wide circle of interests. It is aptly illustrated by C. F. Tunnicliffe who, with his usual excellent drawings gives the reader a faithful record of the garb and the stance of the horsemen and the smithy—and the shape of the collar and hames for those who were born too late.

P.J.O.T.

Work Simplification in Agriculture. D. W. PATERSON. Land Books. 21*s.*

Physical work is an expensive occupation nowadays and the farmer, like many others, has powerful incentives to reduce it. Mr. Paterson offers to help him to do so by showing how the time taken for farm jobs can be reduced with little or no capital expenditure.

The jobs he discusses, such as bucket feeding calves, maintaining machinery, milking, mucking out and egg packing, are all highly practical, and he has much of importance to say. He reminds farmers of many things they know but do not always practise, gives some useful advice on particular points, and stimulates observation and useful thought. But he fails to make his collection of hints, tips, and labour-saving principles into a system, while the

general procedure for improving work-methods which he describes is merely a simplified version of a primitive type of work study current some years ago but now superseded by more effective techniques.

As the style and illustrations suggest, this book is essentially a lengthy pamphlet. Indeed, its contents would probably be more effective if published in pamphlet form—and at pamphlet price.

N.H.

Soil. (Single frame filmstrips in colour, with notes. Marian Ray, 36 Villiers Avenue, Surbiton, Surrey. 30*s.* each).

This new series of five film strips is a valuable contribution to the visual aid resources of secondary school teachers of rural science and geography; certain sections of the material will also be of interest to students at agricultural colleges, farm institutes, and in day-release and evening classes.

All the strips are in colour. Each comprises a sequence of diagrams and photographs, supported by a booklet containing detailed notes, and a list of reference books. There is also a useful index.

The producer has secured exclusive technical authorship for one of the strips, No. 3, *Soil Profiles and their Formation*, which is the responsibility of Dr. E. A. Fitzpatrick. With the other strips, there have been consultations between the producer and various experts mentioned in the credits.

No. 1, *Rocks and Erosion*, gives a lucid exposition of the cycle of geological change, the origin and characteristics of parent rocks and minerals, and the various agencies of decomposition and reconstitution, and leads up to the point where vegetation first appears.

The second strip, *Plants and Decay*, deals with the requirements of plants in general terms, the role of soil fauna, bacteria and fungi in the decay of plant materials, and gives valuable diagrams illustrating the carbon and nitrogen cycles. It concludes with a brief indication of the concept of the soil profile. Strips 1 and 2 are eminently suited to the needs of rural science classes in secondary schools, and should be helpful in farm institute and evening class introductory lectures.

The treatment of the third strip, *Soil Profiles and their Formation*, is probably more suited to the needs of senior students. It should certainly find a place in the appropriate courses at agricultural colleges as well as with advanced geographers. There is a thorough account of the interaction of climate, parent material, topography, plants and animals, and of time itself in the formation of the distinctive natural body which is the soil profile.

Composition of Soil, the fourth strip, should interest both school and vocational audiences. It gives useful accounts of the mineral fraction and soil texture, soil air and water relationships, tilth and structure. Crumb formation and base exchange are well illustrated, and there is a final section on the mechanism of nutrient intake. Deficiency symptoms are notoriously hard to reproduce with the precision that accurate diagnosis demands, but the student seeking more information would naturally turn to Professor Wallace's *Atlas*.

The final strip, *Soil and Farming*, could well stand on its own as an introduction to farming and crop cultivation for schools. The diagrams illustrating rotations and their development over the ages may also be very useful for introductory purposes in institutes and other places.

J.H.C.

The Poultry Farmer's Veterinary Book. NORMAN BARRON and RAY FELTWELL. Dairy Farmer Books. 21*s.*

The authors of this book have sought to provide a practical basis for the control of poultry diseases by presenting information, collected from the available literature, in a simplified and readily accessible form. In this they have largely succeeded, but the book suffers from certain defects which are almost inevitable in one compiled this way.

It is arranged like a dictionary, the diseases being dealt with in alphabetical order, the more important ones having separate paragraphs on cause, species affected, differential diagnosis, treatment and control. Not everyone will agree with the authors' assessment of how much space should be allotted to the various diseases: some might well have received less attention and others more, but a very full coverage has been provided. The general information is up to date, and the recommendations for control and prevention accord with modern concept and

practice. Ample cross references are given and there is a comprehensive diagnosis chart and a number of excellent illustrations.

The importance of management in disease prevention is stressed throughout, and much of the book is devoted to this subject in its widest aspects, including feeding, incubation, care of chicks, broilers, ducks and geese.

Although the book is a mine of information, there are some surprising omissions. Thus, while we are told that *Pseudomonas pyocyaneus* has been found in the air sac of a rook, no reference has been made to the fact that a poultry farmer suspecting the presence of Newcastle disease in his flock should report to the police and take the immediate precautions incumbent upon him under the Fowl Pest Order.

Fumigation with formaldehyde gas might have received more attention; unaccountably, pre-incubation fumigation of eggs to prevent salmonellosis is not described, and the amounts of materials quoted for the fumigation of incubators differ from the usual recommendations. More precise details might also have been given of the various drug treatments recommended.

There is a suggestion of hurried writing and insufficient revision. Some inaccuracies and, at times, loose and careless phraseology and a number of spelling errors (even the glossary is not exempt from these criticisms) detract from an otherwise valuable and very readable book, which can be recommended to poultry farmers for handy reference.

J.E.W.

Dairy Produce, 1959. Commonwealth Economic Committee. H.M. Stationery Office. 7*s.* 6*d.* (8*s.* 1*d.* by post).

This compilation of world statistics reviews the production, trade, consumption and prices of butter, cheese, condensed milk, milk powder, casein, eggs, egg products and margarine.

Figures are tabulated and discussed for the years 1954 to 1958 and also for 1938, so that some interesting comparisons are possible. The following indicate the type of information which is given.

A marked increase of butter imports into the United Kingdom in 1958 led to the highest consumption per head, just over 20 lb a year, since before the war. The position was reversed in 1959, when consumption fell slightly and more margarine was eaten.

The Netherlands continue to be the world's leading exporters of cheese, followed closely by New Zealand. A long-term upward movement in world cheese production continued in 1958, when the total was 75 per cent greater than before the war.

Egg production in the United Kingdom has increased, and the consequent fall in prices has resulted in far more eggs of United Kingdom origin being used to replace imported egg products.

Special note of the contribution of Commonwealth countries is made throughout the review. It contains two appendices, dealing respectively with government measures affecting dairy products in different countries and with import duties and controls.

A.J.L.L.

Young Farmers' Clubs in Schools. National Federation of Young Farmers' Clubs. 6*s.*

That excellent organization, the National Federation of Young Farmers' Clubs, has produced a book that will be of great use to all concerned with young people, whether they are banded together in a Young Farmers' Club or not. But the publication is not without drawbacks.

Because the book generally indicates that more attention should be given to organization than to occupation, and to procedure rather than performance, it is well that there is early warning against attempting at any one time all that is advised. The authors also have their own didactic way of stating the obvious and, although this makes for a longer book, it tends to impede the flow—for example, such sentences as "Cooking Danish bacon demands less skill than curing and cooking one's own pig; and there is more than a grocer's counter between oneself and home-made cheese". This over-elaboration is tedious, and the whole book is full of similar platitudes.

Again, while it is possible to agree with the opinion that school clubs are better when organized as out-of-school activities, it would be interesting to have some explanation of what is the "conventional teacher/pupil situation". It would seem that the authors were particularly unfortunate in their sampling; otherwise they would surely have found schools where "teacher/pupil situations" are entirely un-

conventional, and where in-school clubs flourish.

In spite of such faults the book is helpful, well printed and illustrated, and it has many useful pointers for those helping young people. There are sections on programme planning and sources of information; and there is a good index.

The claim for the book made by the authors, that "like a good soup it has accumulated", is true, but the thought is engendered whether indeed it has accumulated too much.

A.S.

Agricultural Holdings (Second Cumulative Supplement to the 11th Edition). J. MUIR WATT. Sweet and Maxwell. 7*s.* 6*d.*

The classic reference book *Agricultural Holdings,* incorporating a wise and witty manual on "Tenant Right Valuation" by Derek Chapman, was published in March 1959 and included a small supplement dealing with certain statutory forms. A second cumulative supplement to January 1960 has just been published, and its importance to the main text must be emphasized.

In Part I of the supplement will be found comments on a leading case decided since the publication of the main work; Gladstone v. Bower (1959) 3.W.L.R. 815 (1959) 3. All E.R. 475. Part II discusses the effect on Tenant Right Valuations of the Farm Improvement (Standard Costs) Regulations, 1959 (S.I. 1959 No. 1555), and brings up to date information on compensation for short-term new improvements. Additional notes to the main work are contained in Part III, and Part IV gives more forms and the text of a new Statutory Instrument.

Throughout the supplement the numbers of the relevant pages in the main work are boldly printed, and this makes the correlation of supplement and book an easy matter. It is inevitable that a legal work should remain definitive only for a limited time, and if there must be supplements, let them be like this one.

R.G.A.L.

Our Developing World. L. DUDLEY STAMP. Faber and Faber. 21*s.*

This book springs from Dr. Stamp's earlier volume *Our Undeveloped World*; it is an indication of the speed of change in this world that, after only seven years, such a publication is necessary. It is most welcome, for it helps to resolve the paradoxical concepts now so frequently put before us: is the world starving to death, or is farming to be a depressed industry because of a production surplus?

With the wealth of concise and logical reasoning, the author sets out the problems of population growth and feeding: he carries out the theoretical exercise of estimating when, at the present rate of growth, there will be standing room only on earth. There is, however, some discrepancy in his figures; the United Nations figure of 600 years is given on page 21, and 2,000 years is quoted on page 180. The difference seems likely to have arisen from the calculations being made at different dates, the larger figure being that of the original book (1953) and the smaller the more recent U.N. one.

This is another indication of how the rate of growth itself has increased in the period between the publication dates of the books. Not that the difference is of much importance, for some correcting factor must come into play long before anything like this happens. But the important thing is that the Malthusian threat is there; population can outrun food resources at some point if we continue to increase at our present rate and much sooner if the rate of increase is stepped up.

Dr. Stamp points out the enormous differences existing between countries in the agricultural productivity of their land and labour, and that it is not necessarily the wealthiest countries which are the most efficient farmers.

The author explains his valuable concept, the Standard Nutrition Unit (SNU), which is the amount of food needed to give a million calories. Allowing for the wastage in preparation, this gives about the world average daily need of 2,540 calories per head. With this unit, production and consumption can be measured, as well as farming efficiency and land quality.

The moral for the farmer is that "food production is becoming more efficient and concentrated in the hands of experts, who produce professionally for the masses, so that the subsistence farmer and peasant producer would seem to be doomed".

Fifty-nine per cent of the world's population is now engaged in agriculture; the same production could be obtained

more efficiently by 5 per cent of it. The figure for Britain is 3 per cent. The world could be better fed by using existing techniques, so that there is room for optimism here. But this situation cannot last if mankind continues to increase regardless.

The book deserves to be commended as a masterly summary of this confusing but so important subject, and everyone should read it. But why did the type have to be so small and the margins so narrow?

G.O.

Temperatures and Humidities in Pig Houses. (National Building Studies Research Paper No. 29). J. B. DICK and P. T. LOADER. H.M. Stationery Office. 1*s.* 9*d.* (2*s.* 1*d.* by post).

It is a pleasure to welcome this useful research paper on temperatures and humidities in pig houses, produced by two physicists working at the Building Research Station. One of the many problems facing the designer of pig houses has been the lack of information on the relationship between figures calculated on the drawing board and those actually obtained on the farm.

This report is an encouragement, for it shows that theoretical values are not usually far removed from the practical figures. It also pinpoints to perfection the great importance in piggery design of a high standard of insulation, controllable ventilation and a minimum area of roof, floor and walls. From the facts given here it appears that it is nearly always possible to obtain climatic conditions in a well-designed fattening house that are very near the environment which scientific experiments have established as being the best. The report shows that these can be obtained without artificial heat, and in such a way that the humidity of the building is kept down to a sensible level.

In one or two respects the paper is incomplete. A fairer title would be "Temperatures and Humidities in Pig *Fattening* Houses in *Winter*", as no attempt is made to deal with the important problems presented in warm weather, nor does it deal with piggeries other than fattening units, such as farrowing accommodation.

The references quoted on the relationship between climate and productivity are strangely inadequate, and it would have been of considerable benefit if this section had been expanded and brought up to date.

However, apart from these points, the booklet is to be strongly recommended. The authors are to be congratulated on the successful outcome of their labours.

D.W.B.S.

Some Chemical Aspects of Plant Disease Control. (Lectures, Monographs and Reports, 1959, No. 3). R. L. WAIN. Royal Institute of Chemistry. 4*s.* 6*d.*

During recent years there has been a renewed interest in the control of plant diseases by chemical means. This is due in part to the realization that breeding for disease resistance very often provides only a temporary advantage, and that new races of the fungus can be produced by a variety of means. In addition, for some diseases no sources of resistant material have yet been found.

In this lecture to the London Section of the Institute, Professor Wain, who is director of the A.R.C. Unit of Plant Growth Substances and Systemic Fungicides at Wye College, gives a broad and lucid survey of the principles underlying the chemical control of plant diseases. Details are given of the chemical nature of the main agents in use at the present time, and of the method by which they exert their fungicidal effect.

Of particular interest is the section devoted to systemic fungicides. Here Professor Wain describes his effort to produce a material which, when taken up by the plant, acts directly or indirectly on the pathogen within the tissues. Substances closely related to the plant growth regulating substances have been tested, as well as naturally occurring substances such as those to be found in the broad bean plant. To date the results have not been comparable to those which produced the systemic insecticides now in use—but in this lecture we get a glimpse of the large amount of time and energy which is being directed to this end.

I.F.S.

Incubation and Brooding. (The Farmer's Booklet Series No. 6.) V. J. WILLIAMS and D. R. JONES. Poultry and Egg Producers Association of Great Britain. 1*s.* 6*d.*

To condense and discuss the principles and practice of incubation and brooding in a sixteen page leaflet is a particularly

difficult exercise. The authors are to be congratulated on the degree to which they have succeeded, but either section alone would have been the better for the full space. Incubation suffers most from the compression; it would have been better to have concentrated on the practical aspects of incubation rooms and management of the machines.

On the hatching of game bird eggs, experience at the Game Research Farm, Fordingbridge, has led I.C.I. to abandon the use of the pure Silkie as a broody, because her fine feathers get entangled in the newly-hatched chicks: they now use mainly Cochin bantam hens. The section on brooding is more comprehensive, and is well put together. The main points of practical management are presented simply and effectively, while the printing and production are good and the reading is easy.

W.M.A.

Lawns. R. B. DAWSON. Penguin. 6*s*.

It is doubtful if anyone in Britain knows as much about the cultivation of turf as does Mr. R. B. Dawson, Director of the Sports Turf Research Institute at Bingley in Yorkshire. Into the 176 pages of this Penguin are packed the essentials of his experience in growing grass.

The chapters are grouped into three sections—"Introductory", "New Lawns", and "Existing Lawns". The advice he gives is, of course, in many ways a counsel of perfection, but if we follow it to the best of our ability, our lawns will certainly be better.

Mr. Dawson tells us about the best grasses to use for lawns and how to construct and prepare the soil. He compares the relative merits of turfing and seeding, and then gives much good advice about routine treatments, mowers and mowing, the use of fertilizers, how to control weeds and, perhaps most interesting of all, some "do's and don'ts". These are pertinent and of inestimable value. Perhaps the most valuable of all is his advice about mowing—"do not shave the turf, but mow regularly, preferably two or three times a week". In telling us to water early in a dry period, before serious signs of drying up appear, he is wise indeed. And he does not advocate very much rolling—a comfort to us all.

These Penguin handbooks are wonderful value for money, and Mr. Dawson's book on lawns must come very near the top of the list.

R.H.

Books Received

A History of the National Investigation into the Economics of Milk Production, 1934–51. Phyllis Manning. Agricultural Economics Research Institute, Oxford. 12*s*. 6*d*. (post free).

Chrysanthemums. E. T. Thistlethwaite. Penguin Books. 6*s*.

Department of Hop Research Annual Report. (Obtainable from the Secretary, Wye College, Nr. Ashford, Kent. 6*s*.

Farm Animals. John Hammond. (Revised 3rd Edition). Edward Arnold. 28*s*.

Journal of Agricultural Engineering Research. (Volume 5, No. 3.) The British Society for Research in Agricultural Engineering, Wrest Park, Silsoe, Beds. 8*s*. 6*d*.

Land for the Future. Crawford, Held and Stoddard. Oxford University Press. 68*s*.

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